£1

Denmark	DKr.	36.00
France	Fr.	52.50
Germany	DM.	9.50
Greece	Dra.	360.00
Holland	DFI	8.90
Italy	L	4300
New Zealand	NZ$	3.70
Spain	Pts.	425.00

Your COMPUTER

► MARCH 1986 VOL. 6 NO. 3

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

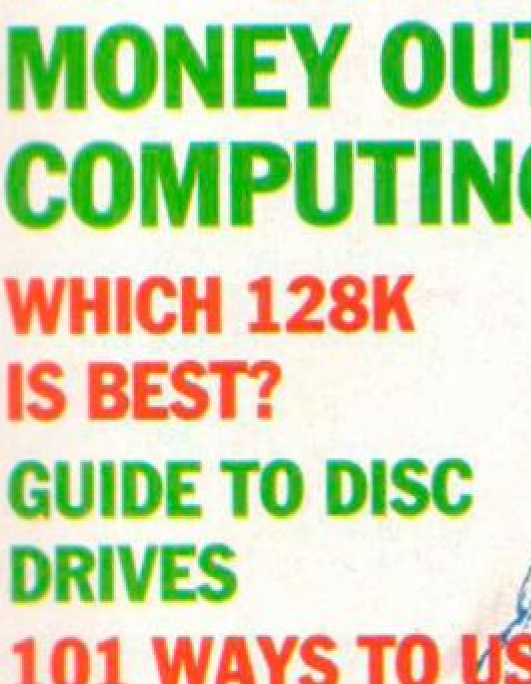


HOW TO MAKE MONEY OUT OF COMPUTING

WHICH 128K IS BEST?

GUIDE TO DISC DRIVES

101 WAYS TO USE YOUR COMPUTER



EXCLUSIVE: SINCLAIR LAUNCH UK SPECTRUM 128

FREE HOME PROGRAMMING COURSE

PLUS: COMMODORE'S NEW C128D · COMPUTER MUSIC AND GRAPHICS


The Standard by which others will be judged.
This is Hardball from Accolade. The first in a new generation of game software that sets the standard for others to beat; if they dare! With graphics so large and lifelike and sound effects so real, you'll believe you really are at the ball park – yes, you can almost smell the hot-dogs!
Sorry, we can't supply the hot-dogs; you'll have to bring your own – but everything else is here to recreate the atmosphere, tension and excitement of big time baseball on your own small screen.
HardBall!™
By Accolade
For Commodore 64
Cassette – £9.95
Disk – £14.95
U.S. GOLD
All American Software


SHE'S COMING
TWISTER
System 3
Available for
Spectrum 48k, CBM 64/128, All Amstrads, All 48k Ataris, Atari ST, BBC B, MSX
ALL TAPES AT 7.50
Amstrad, CBM 64/128, All 48k Ataris
ALL GAMES ON DISK 10.99
Atari ST (Disk only) 21.50
Design: INLINE
System Three Software Limited Davis House 29 Hatton Garden EC1N 8DA Tel. 01 831 7403 Telex 896691/H675

Editor
Gary Evans
Software Editor
Lee Paddon
Production Editor
Harold Mayes MBE
Editorial Assistant
Julian Plumb
Designer
Chris Winch
Sub Editor
Harold Mayes MBE
Editorial 01-837 1686

Group Advertisement Manager
David Lake
Advertisement Executives
Ian Faux
Jeremy Kite
Advertising 01-837 1689

Executive Editor
Paul Coster
Publisher
Richard Hease

**Your Computer
Suite 4,
20-22 York Way,
LONDON N1 9AA.**

Please note
The cover illustruation used on the January cover of *Your Computer* should have been credited jointly to *The Economist* and Abbott Mead Vickers. Our apologies for omitting acknowledgement for permission to use the material.

Printed by The Riverside Press, England.

Typeset by Time Graphics Ltd., Northampton.

Member of the Audit Bureau of Circulation.

Your Computer is prepared with the help of an Amstrad PCW 8256 plus Locoscript and Newword, BBC B + View, Amstrad CPC6128, Spectrum 48K, Commodore 64 and some very expensive typesetting computers.

Unfortunately we are unable to answer lengthy enquiries by telephone. Any written query requiring a personal answer MUST be accompanied by a stamped, self addressed envelope – please allow up to 28 days for a reply.

Subscriptions: UK £14 for 12 issues. Overseas (surface mail) £22.50 – Airmail rates on request. Please make cheques/postal orders payable to Focus Investments. Send orders to Your Computer Subscriptions, Oakfield House, Perrymount Road, Haywards Heath, RH16 3DH.

Single back issues of the magazine are available for £1.50 from the Back Issues Department, Suite 4, 20-22 York Way, London, N1 9AA.

Distributed by Business Press International, Quadrant House, Surrey SM2 5AS.

CONTENTS

THE *YOUR COMPUTER* COURSE IS BETWEEN PAGES 46 AND 47

Exclu

SPECTRUM
Turn to page 7
Spectrum com
features of the
players and se

sive

28 REVIEW

or full details of Sinclair's new, upgraded uter. Extra memory is just one of the many achine which should delight games ous enthusiasts alike.



GET EVEN MORE ATTAC



T.V. Modulator for CPC 6128 £29.95


Joystick with additional joystick adaptor £14.95



Disc Drive with Interface and CPM for CPC 464 £159.95


Speech Synthesiser and stereo amplifier £29.95



Light Pen complete with graphics software £19.95



RS 232C Interface Inc ROM Software £49.95

AVAILABLE AT ALLDERS · BOOTS · COMET · CURRYS · DIXONS · LASKYS · RUMBELOWS ·

HED TO YOUR AMSTRAD.







Amstrad owners start out happy, and get even happier as time goes on.

The first delightful discovery is that both the CPC 6128 and the CPC 464 are complete and ready to use as soon as you get them home.

The CPC 464 comes with built-in datacorder, and the CPC 6128 with built-in disc drive. And both have either a full colour monitor or a green screen.

But Amstrad owners can become even more attached to their computers with the simple addition of the peripherals featured here.

They'll make your Amstrad faster, harder working and more entertaining.

And they're very easy to attach. Simply plug in, and away you go, there's no need for extra interfaces.

You may of course wish to get into some even more serious computing, for which you will need the Amstrad RS 232C specialist interface. This opens the door to modems, networks, and serial printing.

But whichever additions to your Amstrad you care to make you'll find their low prices an additional pleasure.



YC/P/4

Tell me more about the Amstrad range of peripherals.

Name____________________

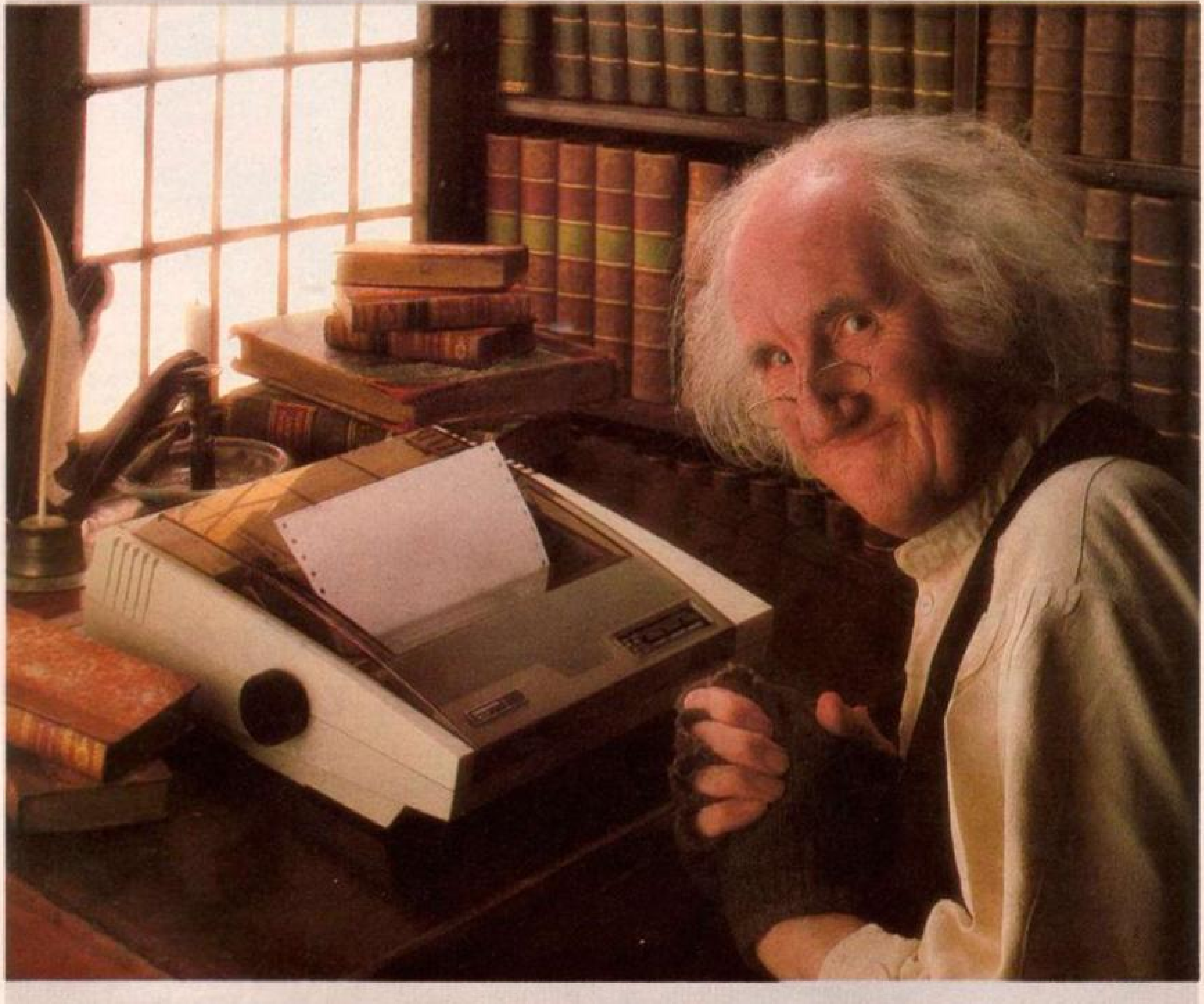
Address____________________

Amstrad peripherals

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF.

SUPREME DISCOUNT STORES · TANDY · W.H. SMITH · AND GOOD INDEPENDENT COMPUTER STORES

Thrifty micro owners choose the new MT80+



Keen on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

The MT80+ prints at 100 cps and is compatible with just about any popular office or home micro. For true print flexibility, there's compressed and expanded print, subscripts and superscripts, bold print, italics and, of course, graphics.

You'll have to see the print quality to believe it, thanks to the outstanding film ribbon cassette. Continuous fanfold stationery or friction fed single sheets pose no problem. And if you're in a hurry the quick tear facility is a real bonus.

The new MT80+ from Mannesmann Tally. Europe's leading matrix printer manufacturer. You'll be laughing all the way to the bank. Contact us now for our literature pack.

MANNESMANN TALLY

MANNESMANN TALLY LIMITED, MOLLY MILLARS LANE, WOKINGHAM, BERKSHIRE, RG11 2QT. TELEPHONE (0734) 788711



"My two top contenders"

1. Scooby Doo
by Elite
In the red corner we have Scooby Doo – a real heavyweight when it comes to catching criminals, ghosts and other things that go bump in the night.

2. Super Sleuth
by Gremlin Graphics
And in the blue corner another Super Sleuth. Which one will come out tops? Hard to say, Harry, but both are champs in my book.

THORN EMI Computer Software
International Micro Software Division

"Take a ringside seat and sample the excitement"

CLIFF HANGER

by New Generation
This fighter doesn't use his fists, man, – but everything else in sight! Cannons, boulders, boomerangs and bombs all come in handy for Cliff who has to do *something* to stop the bandit shooting up the canyon.
Spectrum 48K **£4.95**

GRUMPY GUMPHREY SUPERSLEUTH

by Gremlin Graphics
Keep your eye on the clock and look sharp! All your best moves have to be executed on time or you're in big trouble. Catch the shop thieves and above all keep the Manager happy – my motto exactly!
Spectrum 48K **£7.95**

MINI OFFICE

by Database
Comprising word processor – for writing letters and reports, a database – for storing addresses, and a spreadsheet – for storing complicated numbers. Pretty high-powered stuff, don't you think?
BBC **£5.95**

MAD DOCTOR

by Creative Sparks
As Mad Doctor, in this blood-curdingly evil game, the player must create new life out of freshly killed body parts. If he arouses the villagers' suspicions, they'll kill him. A light touch on the scalpel is required.
Commodore 64 **£8.95**

kout games for fans where'

MARSPORT

by Gargoyle Games
Box your way out of this one! The World needs a Champion (what about me?) Yes, but *you* can be the champ here. That is if you sneak the defence plans from the doomed city and reinforce the force sphere. Not easy, with aliens attacking your every move.
Spectrum 48K and Amstrad **£9.95**

DYNAMITE DAN

by Mirrorsoft
Count to ten and concentrate. You think you can win on points? Well I tell you this game will have you reeling! He may not be a Jumbo or a Bonecrusher, but one thing is certain, Dynamite Dan is hard to beat.
Spectrum 48K **£6.95**
Amstrad and Commodore 64 **£8.95**

"Games to keep you on your toes".

RED ARROWS

by Database
These guys can sure move. But their game is a non-contact sport, if you get my drift. You can try your hand at formation flying, looping the loop and all the other tricks. Duck, dive, dodge, swerve and break – only don't hit anyone here.
Versions for most machines.
Cassette **£8.95**
Disk **£11.95 & £12.95**

SPOT THE BALL

by Creative Sparks
Two sports classics in one pack, but you only play one at a time, OK? There's soccer and snooker. Both need skill and timing as well as a joystick and 32K ram. Go to it!
Atari 32K **£8.95**

SCOOBY DOO

by Elite
Slippery customers throw in the towel when this ace detective is around. With your help he can track down and solve the mystery that haunts his friends. Join the elite band and pit your wits against the spooks.
Spectrum 48K **£6.95**
Commodore 64 **£7.95**
Amstrad **£8.95**

SPARKLERS SPECIAL

by Sparklers
A fist full of games at a fantastic price. And nobody is pulling punches here. These games really are the greatest – anyone who disagrees will have me to reckon with! Not to mention Slurpy, Orc Attack, River Rescue and Black Hawk.
Spectrum 48K and Commodore 64
4 games for £7.50

"Non-stop thrills from start to finish"

WHO DARES WINS II

by Alligata
Only the brave survive (and the lucky). Upper cuts and left hooks are no good to you here. You need to find the ammunition dumps to knock the stuffing out of the enemy and free your friends.
Commodore 64 **£7.95**
Amstrad, Spectrum and Commodore 128 versions available soon.

All games featured above are available from Laskys, WH Smith and other good software stores.

Win



Spot this month's mystery microgamer and win a fantastic prize. Ten 2-pack program prizes must be won plus single game prizes for the first 100 runners up.

If you think you now the answer, send this coupon to us, no later than 14 December 1985. The first ten correct entries will each receive SCOOBY DOO and SUPER SLEUTH. 100 runners up will each receive a super game for their machine type.

I say the Mystery Microgamer is: ______

Send me your latest full list of software programs.
Name ______
Machine ______
Address ______
______ Postcode ______ YC4

Send to: THORN EMI Computer Software Mystery Microgamer Competition, Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NU

Last month's Mystery Microgamer was Ian McCaskill. Prizes are on their way.

Prizewinners
Andrew James, Swansea
Bobby Earl, Birkenhead
Mark Johnson, Knottingley
Stephen Hirst, Castleford
Barry Cheeseman, Swindon
Graham Langlands, Dundee
Tim Walter, Bristol
Paul Cooke, Blackpool
Robert Wooley, Peterborough
John Baxter, Coventry





THE 520ST. OVER QUAL

AVON BRISTOL
Computer Exchange.
AVON BRISTOL
Laskys.
AVON BRISTOL
Radford Hi Fi.
BEDS BEDFORD
Bedford Computers.
BEDS LUTON
Hobbyte Ltd.
BEDS LUTON
Laskys.
BELFAST
CEM Micro-Computer Services Ltd.
BELFAST
Computer All Ltd.
BELFAST
Education Company Ltd.
BELFAST
Ideal Radio.
BELFAST
N.P.O.
BERKS READING
HMV Micro Shop.
BERKS. READING
Laskys.
BERKS SLOUGH
Laskys.
BERKS SLOUGH
Silicon Chip.
CAMBS CAMBRIDGE
Cambridge Computer Store.
CAMBS CAMBRIDGE
Laskys.
CAMBS PETERBOROUGH
Laskys.
CENTRAL FALKIRK
Microplus.

CHESHIRE CHESTER
Laskys.
CHESHIRE CREWE
Woottons TV
CHESHIRE WARRINGTON
Warrington All Computers.
CHESHIRE WILMSLOW
Fairhurst Instruments Ltd.
CLWYD WREXHAM
Micro Computer World.
CLWYD WREXHAM
Micro Computer Centre.
CO.DERRY
Donaghy Brothers.
CO. DOWN WARREN POINT
Visions Video.
CO. DURHAM
DARLINGTON
Darlington Computer Shop.
DERBYSHIRE
CHESTERFIELD
F.A.W. Electronics.
DEVON EXETER
Laskys.
DEVON PLYMOUTH
Laskys.
DEVON PLYMOUTH
Syntax Ltd.
DORSET BOURNEMOUTH
Lansdowne Computer Centres.
DORSET POOLE
Lansdowne Computer Centres.
ESSEX COLCHESTER
Colchester Computer Centre.
ESSEX COLCHESTER
Capricorn Computers.
ESSEX COLCHESTER
Laskys.

ESSEX HARLOW
Achter Instruments Ltd.
ESSEX HARLOW
Laskys.
ESSEX ROMFORD
Laskys.
ESSEX SOUTHEND
Laskys.
ESSEX SOUTHEND
Estuary Computers.
ESSEX WESTCLIFF-ON-SEA
Sterling Resources.
FIFE GLENROTHES
Computer Services (Scotland) Ltd.
GLOUS CHELTENHAM
Laskys.
GLOUS GLOUCESTER
Laskys.
GRAMPIAN ABERDEEN
Laskys.
GRAMPIAN ABERDEEN
Microshack.
GT. MANCHESTER BOLTON
Computer Annex.
GT. MANCHESTER
FAILWOODFIELD
Mighty Micros.
GT. MANCHESTER
MANCHESTER M4
Laskys.
GT. MANCHESTER
MANCHESTER M1
Laskys.
GT. MANCHESTER
MANCHESTER
Lewis's Ltd (Sound & Vision).
GT. MANCHESTER
MANCHESTER
NSC Computershops.

GT. MANCHESTER STOCKPORT
New Mills Micro Centre.
MERSEYSIDE LIVERPOOL
Lewis's Ltd (Sound & Vision).
GWENT EBBW VALE
Computability.
HANTS PORTSMOUTH
Microchoice.
HANTS SOUTHAMPTON -
AMS Systems Limited.
HANTS SOUTHAMPTON
Laskys.
HERTS ST ALBANS
Hobbyte Ltd.
HERTS WATFORD
Laskys.
HIGHLAND INVERNESS
Nova Computers.
HUMBERSIDE HULL
Golding Computer Services.
HUMBERSIDE HULL
Tommorrows World.
KENT BECKENHAM
Transform Ltd.
KENT BEXLEY HEATH
Laskys.
KENT BROMLEY
Laskys.
KENT MAIDSTONE
Kent Microcomputers.
KENT MAIDSTONE
Laskys.
KENT ORPINGTON
Lever Computers.
KENT SEVENOAKS
Chalk Hill Computers &
Office Supplies.
KENT SWANLEY
Swanley Electronics.

KENT SIDCUP
Silica Shop.
KENT WELLING
K.E.C.M. Computers.
LANCS ACCRINGTON
PV Micros.
LANCS BLACKPOOL
Lewis's Ltd (Sound & Vision).
LANCS BOLTON
Computer World.
LANCS BURNLEY
Bytes And Pieces.
LANCS DARWEN
Grahams Micro Shop.
LANCS LANCASTER
Castle Computers.
LANCS LANCASTER
Online Computer Services.
LANCS OLDHAM
Home & Business Computers.
LANCS PRESTON
Lasky's.
LEICS HINCKLEY
Leigh Computer Systems.
LEICS LEICESTER
Dimension Computers.
LEICS LEICESTER
May's Hi Fi Ltd.
LEICS LEICESTER
Lewis's Ltd (Sound & Vision).
LEICS LEICESTER
Laskys.
LEICS LEICESTER
Data Nest.
LINCS GRANTHAM
OakLeaf.
LONDON BROCKLEY
Homeview Video.

LONDON NW4 Laskys.
LONDON NW5 Zoomsoft.
LONDON SW13 LEWISHAM
Laskys.
LONDON W5 EALING
Laskys.
LONDON W9 MAIDA VALE
Micro Monde Ltd.
LONDON W1 Compuface Ltd.
LONDON W1 Laskys.
LONDON W1 Laskys.
LONDON W1 Micro Anvika.
LONDON W1 Silica Shop.
LONDON W1 Selfridges.
LONDON W1
Computers of Wigmore St.
LOTHIAN EDINBURGH
Laskys.
LOTHIAN EDINBURGH
Silicon Centre.
LOTHIAN EDINBURGH
The Games Master Ltd.
MERSEYSIDE LIVERPOOL L1
Laskys.
MERSEYSIDE LIVERPOOL L2
Laskys.
MERSEYSIDE SOUTHPORT
Central Studios.
MERSEYSIDE ST HELENS
Microman Computers.
MIDDLESEX ENFIELD
Jennings Stores Ltd.
MIDDLESEX ENFIELD
Laskys.
MIDDLESEX NORTHWOOD
Screens.



THE ATARI 520ST Personal Computer has a list of qualifications as long as your arm. With a powerful 16 bit processor and 512k of memory linked to high resolution graphics and 512 colours its work is fast, clear and sharp on your screen, no matter how demanding the task.

Controlling the 520ST is easy through its mouse and unique operating system incorporating GEM desk top manager, whilst its eleven peripheral connectors including MIDI interface enables it to mix and communicate easily with other computer products.

The ST which presents itself in smart modern styling comes with powerful BASIC plus Logo programming languages, a word processor and drawing programme, yet costs only £652* including disc drive and black and white monitor.

IFIED AND UNDERPAID.

MIDDLESEX PINNER
P & H Micro.
MIDDLESEX RUISLIP MANOR
Intech Software Ltd.
NORFOLK GT. YARMOUTH
The Micro Shop.
NORFOLK NORWICH
Tetranite (Spectrum).
N. YORKSHIRE YORKS
Laskys.
N. YORKSHIRE YORK
Microbridge.
N. YORKSHIRE YORKS
York Computer Centre.
N. YORKSHIRE RIPON
Arthur Yates Ltd.
NOTTS HUCKNALL
S P Electronics.
NOTTS MANSFIELD
Mansfield Computers.
NOTTS NOTTINGHAM
Intoto.
NOTTS NOTTINGHAM
Laskys.
NORTHANTS NORTHAMPTON
Laskys.
NORTHANTS NORTHAMPTON
Northampton Home Computers.
NOTTS REDDINGTON
GA Computers.
OXON HEADINGTON
Maddison Computers.
OXON OXFORD
Laskys.
OXON OXFORD
Selfridges.
ORKNEY STROMNESS
Get Taped.

PERTHSHIRE BLACKFORD.
Silicon Glen Ltd.
SHETLAND LERWICK
Tomorrows World.
S. GLAMORGAN CARDIFF
Cardiff Micro Computers.
S.GLAMORGAN CARDIFF
Laskys.
S. GLAMORGAN CARDIFF
South World Computers.
S. YORKSHIRE DONCASTER
Danum Computer Systems.
S. YORKSHIRE ROTHERHAM
Rotherham Computer Centre.
S. YORKSHIRE SHEFFIELD
Just Micro.
S. YORKSHIRE SHEFFIELD
Laskys.
STAFFS. STOKE-ON-TRENT
Lewis's Ltd (Sound & Vision).
STAFFS. STOKE-ON-TRENT
Town Computers.
STRATHCLYDE GLASGOW
Laskys.
STRATHCLYDE GLASGOW
Lewis's Ltd (Sound & Vision).
STATHCLYDE GLASGOW
Unitsoft.
SUFFOLK SUDBURY
Sudbury Microsystems.
SURREY CROYDON
Laskys.
SURREY FARNHAM
Farnham Computers.
SURREY GUILDFORD
Laskys.
SURREY KINGSTON
Laskys.

SURREY LEATHERHEAD
Evergreen Ltd.
SUSSEX BRIGHTON
Brighton Computer Exchange.
SUSSEX BRIGHTON
Brighton Computer Centre.
SUSSEX BRIGHTON
Laskys.
SUSSEX CRAWLEY
Laskys.
SUSSEX WORTHING
Data Direct.
TAYSIDE DUNDEE
Cursor Keys.
TAYSIDE DUNDEE
Micromania.
TAYSIDE PERTH
VICS.
TYNE AND WEAR GATESHEAD
Currie & Maughn.
TYNE AND WEAR
NEWCASTLE UPON TYNE
Laskys.
WARWICKS LEAMINGTON SPA
Spa Computer Centre.
WARWICKS NUNEATON
Micro City.
WARWICKS NUNEATON
Warwick Computers.
W. MIDLANDS BIRMINGHAM
Lewis's Ltd (Sound & Vision).
W. MIDLANDS BIRMINGHAM
Software Express.
W. MIDLANDS BIRMINGHAM
Laskys.
W.MIDLANDS BIRMINGHAM
Lee Computers.
W. MIDLANDS COVENTRY
Coventry Micro Centre.

W. MIDLANDS COVENTRY
Laskys.
W. MIDLANDS DUDLEY
Central Computers.
W. MIDLANDS
WOLVERHAMPTON
Laskys.
W. MIDLANDS
WOLVERHAMPTON
Micro Business Centre.
WORCS KIDDERMINSTER
Central Computers.
WORCS REDDITCH
Ampower Video and Computers.
W. GLAMORGAN SWANSEA
Bucon Ltd.
WEST LOTHIAN
LIVINGSTONE
Computer Centre.
W. YORKSHIRE BRADFORD
CNA Computing.
W. YORKSHIRE HALIFAX
Abacus Computers.
W. YORKSHIRE
HECKMONDWIKE
Thought & Crosses.
W. YORKSHIRE
HUDDERSFIELD
Microworld.
W. YORKSHIRE LEEDS 12
Farnells.
W. YORKSHIRE LEEDS 6
Interface Engineering Ltd.
W. YORKSHIRE LEEDS
Lewis's Ltd (Sound & Vision).
W. YORKSHIRE LEEDS
Laskys.
W. YORKSHIRE LEEDS
Micropower.

Why? Because at Atari we bring up our products to work hard for their living.

ATARI®
Power Without the Price™

*This price is exclusive of VAT.
GEM™ is a registered trademark of Digital Research.

Edit...

SINCE ITS early days, the computer market has been at the mercy of the peaks and troughs of demand which mean that many companies make more than 50 percent of their sales in the trading quarter which precedes Christmas. Hardware and software producers alike suffer from that erratic nature to their trading, one which can play havoc with the cashflow even in the biggest organisation.

It is interesting to note that the wildly fluctuating pattern to trade is purely a Western phenomenon. The Japanese market operates in a far calmer atmosphere, with an even distribution to trade which enables companies to take a far more studied approach to their marketing plans. The year 1986, though, may be the one in which the U.K. market begins to show the level of maturity which will mean that the distribution of sales in this country throughout the year will begin to take on a more even pattern.

The evidence for that observation lies in the level of activity evident in the home computer market during the first few months of the year, a time at which it has been traditional for the market to go into a post-Christmas slump. Major new hardware is being launched almost every week – the Spectrum 128 and Commodore 128 are only two of the new machines which have been announced this year.

On the software side the volume of new packages reaching the *Your Computer* offices for review is matching those of a busy November. In some cases, the software reaching the market now was scheduled for pre-Christmas launch which was delayed by technical problems but many company releases are part of an overall strategy to keep the market bouyant throughout the year.

The success of last year's summer games products showed that computer users do not necessarily abandon their computers for the beaches of Spain in the summer months. To capture their interest and their cash, though, it is essential to launch quality software throughout the year.

The message to all software and hardware manufacturers is to keep the quality of their products at the highest level for the full twelve months of a year. If they keep all the best releases for the end of the year they will have only themselves to blame if that is when they make most of their sales.



Gary Evans.

News

El Nova Spectrum No Big Surprise

As you will have no doubt seen on the cover, the UK version of Sinclair's Spectrum 128K machine has finally been unveiled. After months of delays and denials about the new Spectrum-compatible micro, Sinclair shipped a review copy of the machine to Your Favourite Computer magazine in late January.

There are a few surprises. First of all, it's not much more than anglicised copy of the Spanish machine with a British keyboard stuffed on top. Although there's a new 128 Basic WITHOUT the single-keyword entry which has been the hallmark of the company's machines since the days of the ZX-80, the Spectrum 128 sports the same built-in serial port, monitor port and socket for a numeric keypad as the Spanish model (but, unlike the Spanish machine, the numeric pad itself will not come bundled in the base price of the machine).

At press time, there were not prices available for the new machine – but it's not hard to guess how much the Spectrum 128 will have to sell for. With the QL selling at £200 and the Spectrum Plus hovering between the 'official' price of £130 and the more usual retail price closer to £100, Sinclair is likely to peg the 128 at no more than about £150.

And within a few months, it wouldn't be surprising to see the 128 take over altogether from the current Spectrum Plus, the existing QL drop to about £150 and a new QL with built-in disk drive launched at between £200 and £250.

SOFTWARE SNIPS

Aside from the usual collection of software exclusives (see our review section), this month has also brought forth a number of interesting new sequels and re-releases.

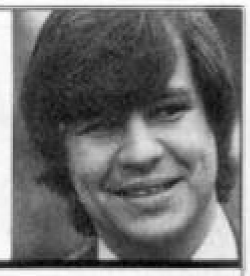
Probably the most interesting sequel is JET, a follow-up to the hugely successful Flight Simulator, offered in the US for the Commodore 64, Apple II and IBM PC. The original Flight Simulator became one of the best-selling simulations on the 64 and also became the standard by which IBM PC compatibility was measured. Jet, in a rather obvious move, puts you in charge of a modern jet plane – instead of the familiar small aircraft used in Flight Simulator. It also features a unique 'head-up display' instead of simple cockpit and instrumentation views. Like its predecessor, it won't be cheap. It was selling for about $50 in the US in January and probably won't be much less than that in pounds when it comes to the UK.

The re-release I was talking about referred to The Pawn – a complex adventure game which first appeared a couple of months ago as a text-only offering for the QL. But it has been rejigged to include colour pictures and converted for the Atari 520ST to produce one of the show-stoppers at January's Consumer Electronics Show in Las Vegas. It should be available in the UK later this spring.

If you're a follower of the software charts, don't be too surprised if you see programs for the Commodore C16 and the Plus-4 creeping in. Commodore informs us that more than 50,000 Plus-4s and in excess of 100,000 C16s were sold over Christmas – and these new owners are buying software (mostly the budget games from people like Mastertronic) in big numbers. This indicates an interesting trend toward 'disposable software' which could give a whole new lease on life to older – but still enjoyable – programs. What next, a big run on Oric software?



News Editor: Geof Wheelwright
Geof Wheelwright is an experienced journalist who writes regularly for *The Times* computer pages as well as for *News Week*.
He is a former Deputy Editor of Personal Computer News and co-director of London based Greenleaf publishing.



£499 Graduate Signals 512 Rethink

Acorn's new Master series machines are slowly moving their way to market and the price of up-market MS-DOS based Master 512 machine unclear. The cost of the MS-DOS based semi-IBM-compatible Master 512 is still a mystery – except to say that Acorn has promised it will be 'less than £1000'. But when a manufacturer says 'less than £1000' it usually means about £999.99, so it is interesting to compare this speculated price with the new price of the Torch Graduate system.



The Master 512 will use the 80186 processor (a superset of the processor in the IBM PC), run MS-DOS and include the Macintosh-like GEM system and a mouse in the price. Ironically, the price does NOT include the disk drives needed to use that GEM system (and, for that matter, run MS-DOS). You'll have to pay another £300 or so for that.

This fact is interesting to compare with the news that Torch's Graduate make-you-Beeb-compatible-with-the-PC add-on is now only £499 and includes two disk drives, 256K RAM, PC-compatible expansion slots and Psion's Xchange software. The Graduate is currently only available by direct mail-order from Torch.

The new pricing of the Torch device plus the fact that Acorn has not yet set the price on the Master 512 could mean that Acorn chiefs will rethink the proposed price and offer the machine at significantly less than £1000 – or, at the very least, throw in a couple of disk drives.

Which Computer? – C128 in Amiga Clothing

The Which Computer? show in January revealed what Commodore had been saving for some time – a new version of the C128 with built-in disk drive, detachable keyboard and monochrome monitor.

The Commodore 128D – exclusively previewed in this issue – is essentially a reboxed Commodore 128 which looks startling like the Amiga. With an IBM-style detachable keyboard, a boxy main CPU unit containing the 1571 disk drive and interfaces and a bundled maonchrome monitor, the £499 C128D caused many a double-take when sat beside the similar-looking £1000+ Amiga.

The aforementioned Amiga – a dream machine of the first order – should start shipping in the latter part of the Spring and Commodore is currently being coy about pricing on it. It will not, however, be anywhere near as good a deal as the C128D. At £499 plus VAT, the Commodore 64-compatible machine has got to start giving the Amstrad machine a run for their money. (Yes, I know it doesn't include a printer – but then neither does the Amstrad run SubLogic's Flight Simulator or Ghostbusters!).

Clear Signs of the Amstrad PC

Speaking of Alan Sugar's growing army of CPCs and PCWs, they may soon be joined by something else with a PC designation. The word is that the king of the 3 inch floppies is planning a low-cost IBM clone to sit at the top of the PC (W, C or whatever) range.

Eagle-eyes perusers of the PCW 8256 manual – such as the editor of this fine journal, who first pointed it out to me – will notice mentions of CCP/M-86 and MP/M-86 in among the references on the opening pages of the manual. The latter operating systems, of course, will only run on chips in the Intel 8080 family – of which the IBM PC's 8088 is a very prominent member . . .

But the 8256 is by no means being forgotten – large volumes of CP/M software are starting to appear in Amstrad's unique 3 inch disk format. The leader in this seems to be New Star software, which claims to have 120 titles including SuperCalc 2, Delta (a well-known CP/M database), Cardbox and The Cracker (a spreadsheet with integrated graphics). Digital Research, the providers of CP/M, have also been understandably active in providing software for the Amstrad machines – now offering CBasic, Pascal, DR Graph and DR Draw on the PCW 8256.

The outburst of 'foreign languages' such as Pascal for the Amstrad machines could take some of the edge off the long-established lead Acorn's BBC Micro has had in the program development world – although the Sinclair QL has been quietly amassing support.

News

New Atari Hardware – More Power, Lower Price

Sinclair, however, isn't the only company beefing up its micros. In late January, I lunched (a verb meaning 'to dine with'; I lunched, they lunched, we lunch, etc.) with two amiable top dogs from the British arm of Atari. Marketing men Max Bainbridge and Rob Harding revealed that the company is planning to release not one, not two, but a whole series of new machines this year – based almost entirely around the ST design.



The first we're likely to see in the UK are three new variations on the 520ST: the 1040ST (a 520ST with twice as much RAM (1MB), a built-in 720K disk drive, GEM operating system in ROM and built-in power supply), the 520STM (the same spex as the 1040ST, but with no built-in floppy disk, half the RAM – 512K – and a built-in TV modulator to allow it to be used with a TV as well as a computer monitor) and the 520STFM (same as the 520STM, but with built-in 360K floppy disk drive).

The three new machines are not expected to replace the existing 520ST right away, although the new 520STM (that's the one which can be used with the TV and which doesn't come with a built-in drive) and the 520STFM (with built-in single floppy) should sell for slightly less than £400 and £500, respectively. The low price should also allow Atari to sell the machines at retailers (ie Currys, Dixons, Argos, etc.) which had previously considered the 520ST – at more than £750 – too expensive to handle. It will, of course, be possible to upgrade from the lowly 520STFM right up to the 1040ST – but at least this way you won't have to shell out all the money at once.

The company has also started shipping its cheapo hard disk system, although at £850 including VAT, I don't think its THAT cheap – especially when Jack Tramiel had originally talked about a price of around £400 for the hard disk, but the hard disk have does twice the capacity of most systems in that price range (20MB instead of 10MB and seems to work well). For a brief review see below).

Atari Hard Disc – Exclusive Review

The much-touted Atari 'affordable Macintosh', the 520ST, was introduced last year with the promise of many things, including an inexpensive hard disc mass storage unit, operating system in ROM and high-speed operation.

Like many other 68000-based machines released in the last few years – notably the Mac, QL and Amiga – the ST suffered delays in patching-up software problems and add-ons took longer to reach market than the company had planned originally. Along the way, plans for a compact disc ROM player were deferred until later this year; the Digital Research GEM Write and GEM Paint software was dropped as the bundled applications package in the U.K., and the upgrade from disc to ROM-based operating system did not arrive until early this year.

The company has kept its promise, however, to provide a low-cost, high-volume hard disc system which I was fortunate enough to look at for *Your Computer*. The Atari SHD212 is a 20MB Winchester-type hard disc which sells for £850 complete including VAT and plugs directly into the back of the ST.

Unlike many other hard disc systems for machines such as the IBM PC and the Apple II, the SHD212 does not need a special ▶ interface card or an external power supply; everything is built into the hard disc unit. That may account for the size of it. The grey metal box containing everything is about three-quarters as long the ST, almost as wide and easily as high.

On the review model, the cable which connected the unit to the ST could not have been more than one foot long, if that, and meant that the only place we could put the hard disc was turned sideways beneath the monitor, thus putting the 'In use' light at the front of the hard disc out of sight. I assume, however, that production models will have full-length cables which allow a little more flexibility for placing the hard disc.

To start-up the unit, you plug the aforementioned midget cable into the back of the hard disc and the ST, plug the hard disc power cable into the mains and switch on the power to the hard disc. A few seconds later you can switch on the ST and the system will power-up, accessing the external 3.5in. disc drive containing the hard disc device drivers and telling GEM that it should present a desk-top with floppy drives A and B and a hard disc labelled C.

Once the hard disc has been booted, all cabling problems, the multiplicity of power supplies and even the delays in delivery of the bundled software are forgotten. Even the utilitarian SHD212 designation of the hard disc can be forgiven for its tremendous performance.

For anyone who has suffered the delays and frustrations of waiting for a 3.5in. floppy – a cassette – to load a long program, the joy of pressing a button and having your application up and running in a few seconds need not be described.

The real speed of other 68000-based products such as the Macintosh and the QL has long been hidden behind torturously slow storage devices such as 360K floppies and, even worse, Microdrives, so it is a pleasure to see the ST performing like greased lightning with the new Atari hard disc.

Perhaps even more interesting is the implication it has for other low-cost, high-power machines. Atari said originally that it would begin offering peripherals for non-Atari machines and this hard disc would certainly be a very good place to start. Even if Atari strategy has changed sufficiently that it no longer believes it a good idea to offer peripherals for other people's machines, the appearance of this hard disc at less than £1,000 is a heartening sign for the industry and it is certain to be a godsend for ST owners.

The charts

This chart is based on the MicroScope chart as compiled by Gallup.

MicroScope GALLUP

MicroScope is the weekly trade paper of the microcomputer industry. If your computer store doesn't display the latest MicroScope chart, ask the manager to call Mark Salmon on 01-631 1433 — we'll send a copy every week.

AMSTRAD TOP 10

TM	LM	Title	Publisher
1	1	They Sold A Million	Hit Squad
2	2	Yie Ar Kung Fu	Imagine
3	4	Formula One Simulator	Mastertronic
4	3	3D Grand Prix	Amsoft
5	6	Finders Keepers	Mastertronic
6	8	Caves of Doom	Mastertronic
7	5	Soul Of A Robot	Mastertronic
8	7	Computer Hits (10)	Beau Jolly
9	NE	Who Dares Wins 2	Alligata
10	NE	Spellbound	Mastertronic

COMMODORE TOP 10

TM	LM	Title	Publisher
1	2	Rambo	Ocean
2	1	Commando	Elite
3	3	Winter Games	Epyx/US Gold
4	6	Last V8	Mastertronic
5	NE	Koronis Rift	Activision
6	NE	Rock 'N' Wrestle	Melbourne House
7	5	Mercenary	Novagen
8	NE	Kane	Mastertronic
9	4	Little Computer People	Activision
10	NE	Kik Start	Mastertronic

SPECTRUM TOP 10

LM	TM	Title	Publisher	
1	1	Commando	Elite	3
2	10	Winter Games	Epyx/US Gold	2
3	3	Rambo	Ocean	2
4	2	Yie Ar Kung Fu	Imagine	2
5	9	Spellbound	Mastertronic	2
6	7	Saboteur	Durell	3
7	4	Elite	Firebird	3
8	5	Tomahawk	Digital Int	3
9	NE	They Sold A Million	Hit Squad	1
10	RE	Daley Thompson's Super Test	Ocean	2

TOP 30 OVERALL CHART

LM	TM	Title	Publisher
1	1	Commando	Elite
2	2	Yie Ar Kung Fu	Imagine
3	3	Rambo	Ocean
6	4	Winter Games	Epyx/US Gold
4	5	They Sold A Million	Hit Squad
9	6	Formula One Simulator	Mastertronic
5	7	Way Of The Exploding Fist	Melbourne House
8	8	Computer Hits (10)	Beau Jolly
12	9	Action Biker	Mastertronic
20	10	BMX Racers	Mastertronic
13	11	Finders Keepers	Mastertronic
7	12	Elite	Acornsoft
23	13	Spellbound	Mastertronic
10	14	Transformers	Ocean
30	15	Rockman	Mastertronic
22	16	Now Games 2	Virgin
19	17	Saboteur	Durell
NE	18	Big Mac	Mastertronic
11	19	Mercenary	Novagen
NE	20	Tutti Frutti	Mastertronic
16	21	Arcade Hall Of Fame	US Gold
RE	22	Hypersports	Imagine
NE	23	Caves Of Doom	Mastertronic
17	24	Tomahawk	Digital Integration
NE	25	Koronis Rift	Activision
NE	26	Zorro	US Gold
NE	27	Last V8	Mastertronic
26	28	Steve Davis Snooker	CDS
RE	29	Daley Thompsons Super Test	Ocean
NE	30	Vegas Jackpot	Mastertronic

BUBBLING UNDER

Title	Publisher
Barry McGuigan World Champions	Activision
Bounder	Gremlin Graphics
Enigma Force	Monolith
Gunfright	Ultimate
Gyroscope	Melbourne House
Kane	Mastertronic
Kung Fu Kid	Gremlin Graphics
Lord Of The Rings	Melbourne House
One Man And His Droid	Mastertronic
Rock 'N' Wrestle	Melbourne House

UNIT SOFT

DISTRIBUTION

NEW!

ALL GAMES GUARANTEED IN STOCK



5% DISCOUNT & FREE SECURICOR DELIVERY ON ORDERS OVER £40.

NOW!

EASY ORDERING WITH OUR NEW FREEPOST ADDRESS.

COMMODORE		TICK
Commando	6.70	☐
Rambo	6.70	☐
Fight Night	7.50	☐
Little Computer People	7.50	☐
Young Ones	5.95	☐
Zorro	7.50	☐
Skool Daze	6.25	☐
Outlaws	7.50	☐
Goonies	7.50	☐
Yabba Dabba Doo	5.95	☐
Mercenary	7.50	☐
Back to the Future	7.50	☐
Revs	11.20	☐
Enigma Force	7.50	☐
Ball Blazer	7.50	☐
Arc of Yesod	6.70	☐
Gyroscope	6.70	☐
Crazy Comets	5.95	☐
Transformers	6.70	☐
Quake One	7.45	☐
Bounder	7.50	☐
Rock 'N Wrestle	7.50	☐
Superman	7.50	☐
Critical Mass	7.50	☐
Korons Rift	7.50	☐
Dragon Skulle	7.50	☐
Nightshade	7.50	☐
Scalectrix	7.50	☐

SINCLAIR		TICK
Commando	5.95	☐
Deathwake	5.95	☐
Zoids	5.95	☐
Mikie	5.95	☐
Enigma Force	7.50	☐
Zorro	5.95	☐
Transformers	5.95	☐
Cosmic Wartoad	5.95	☐
Yie Ar Kung Fu	5.95	☐
Panzadrome	5.95	☐
Lord of the Rings	11.20	☐
International Karate	4.50	☐
3 Weeks in Paradise	7.50	☐
Winter Games	5.95	☐
Back to Skool	5.20	☐
Arc of Yesod	7.50	☐
Tomohawk	7.50	☐
Saboteur	6.70	☐
Roller Coaster	5.95	☐
Sweevo's World	5.95	☐
Impossible Mission	5.95	☐
Surfchamp	7.50	☐
Gyroscope	5.95	☐
Gunfright	6.70	☐
Artstudio	11.20	☐
Battle of the Planets	7.50	☐
Elite	11.20	☐
Critical Mass	6.70	☐

MSX		TICK
Road Fighter	12.95	☐
Hyper Rally	12.95	☐
Soccer	12.95	☐
Ping Pong	12.95	☐
Boxing	12.95	☐
Yie Ar Kung Fu II	12.95	☐
Yie Ar Kung Fu	11.95	☐
Tennis	11.95	☐
Golf	11.95	☐
Track 'n' Field I	11.50	☐
Track 'n' Field II	11.50	☐
Hypersports I	11.50	☐
Hypersports II	11.50	☐
Athletic Land	10.95	☐
Time Pilot	10.95	☐
Super Cobra	10.95	☐
Sky Jaguar	10.95	☐
Kings Valley	10.75	☐
Circus Charlie	10.75	☐
Antarctic Adventure	10.75	☐
Monkey Academy	9.95	☐
Mopi Ranger	9.95	☐
Comic Bakery	9.95	☐
Knightlore	7.50	☐
Alien 8	7.50	☐
Boulderdash	5.95	☐
Ghostbusters	8.95	☐
Le Mans	7.50	☐

NAME ______________________

ADDRESS ______________________

____

POSTCODE ______________________

I enclose cheque/P.O. for £ ______________________

TELEPHONE ______________________

*UK ONLY

Send order to:
UNITSOFT,
FREEPOST,
GLASGOW G1 4BRC.

NO STAMP REQUIRED

Y.C.

Software previews

Ariolasoft is set to launch a *Golf* programme for the Commodore 64. *Your Computer* has seen a version of the game which apart from a few minor alterations, was in its final form.

Golf was programmed by a team of Hungarian programmers. A Hungarian's miss-spent youth is obviously spent on the golf course rather than the snooker hall, as the authors of the game display an impressive appreciation of golf. Ariolasoft has shown Golf to a number of dedicated players and the reaction has been very favourable and that had nothing to do with the fact that the demonstrations took place around the 19th hole.

To enjoy the game it is not necessary to have played the real thing. The game begins with an invitation to select the course on which you wish to play, from a menu of four options. The program also has a course designer which will allow programmers to construct a local course if they wish to do so.

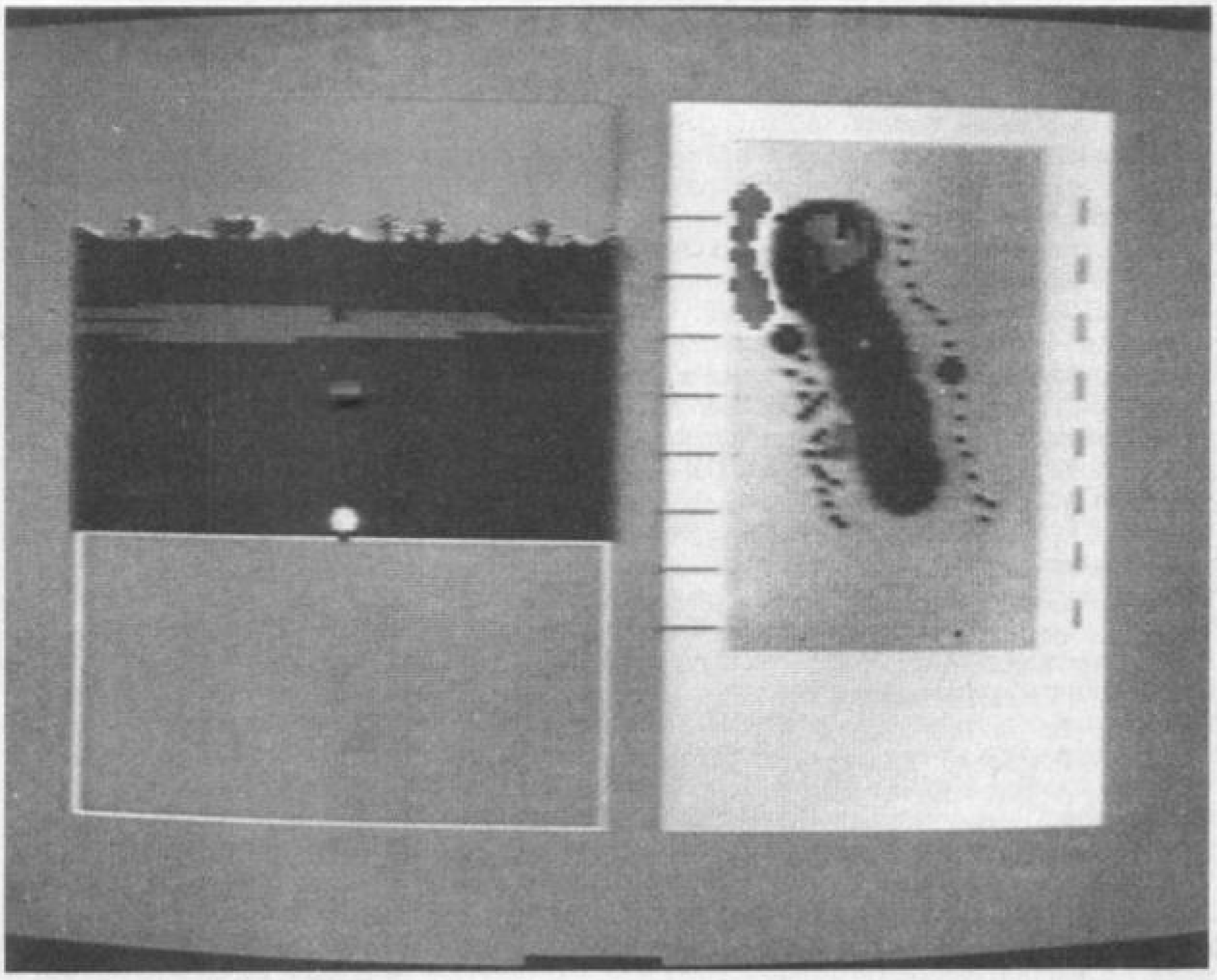
The initial screens allow players to select various parameters which will govern the rest of the game. For the first *Your Computer* game we let the computer choose the weather conditions, only to discover that it had us on the course with a force eight gale blowing – Hungarians must have some strange ideas both about the weather in this country and the mentality of the British golfer. Needless to say, that made playing the game very difficult, if not impossible. Ariolasoft says, though, that production versions will not allow the wind speed to reach these levels.

For our next session the wind speed was set to zero – from the ridiculous to the sublime. We opted to change our handicap – another of those variables available before play begins. We are not proud at *Your Computer* and awarded ourselves a fairly good rating – the skill level affects the accuracy of the shots taken during the game, so the lower your handicap the more likely it is that your straight drive from the tee will head for the green rather than the nearest bunker.

When playing, the screen is divided into a number of distinct areas. One shows an aerial view of the hole in play, while another presents the player with the view which would be seen from the ground looking toward the hole. In both cases, Golf makes the best use of the CBM64 graphics chip to produce a life-like display.

To hit the ball, the player must select various parameters which will affect the direction, speed and the height of the golf ball. That done, the computer golfer sits back and decides at exactly which point during his stroke he will strike the ball.

The game will appeal to armchair golfers; every club house should certainly have one. In addition, by virtue of its excellent graphics and playability, it looks set to appeal to those who feel they should get to know the game of golf, but for whom the outdoor life is strictly for the birdies.



MAD ABOUT MARBLES

Mark Cale of System 3 invited *Your Computer* to his company's new offices in London's Hatton Garden with the promise that he had an exclusive preview for us. After going through the fortified entrance to the building – Hatton Garden is the centre of the English diamond trade and behind the locked doors of most of the buildings there are enough diamonds to give most of the women in the country a best friend.

Finally we reached Cale's top-floor office. As Systam 3 had only just moved from the South Bank, the office was still in a chaotic state but after inplugging a kettle and an electric typewriter, a CBM64 and TV could be switched-on. There then followed a battle with a TV set which refused to tune into the computer output signal but, in the end, will-power prevailed and we had the ready prompt.

The game Cale had to show was at such an early stage of development that it had yet to be named. Mad Marbles or Crazy Marbles were the favourites and from that you will guess that the new game is a version of the arcade game which involves piloting a ball down a slope; it sounds easy but it is not. Many of the finer points of the game had yet to be finalised and programmed but the vacuum cleaner which scrapes the pieces of shattered balls which fall off the slope, one of Cale's favourite elements, made several appearances during the time we were at the controls.

After that it was on to the Three Compasses to talk to Cale about future plans for System 3.

Software shorts

Melbourne House have released Starion for the Amstrad. This was well received on the Spectrum. A sort of poor man's Elite, it consists of zapping wire frame graphics and solving cryptic cludes.

Koronis Rift comes from Lucas Film via Activision and is on the Commodore. It's all about zapping spacecraft and destroying the enemy base on the planet's surface. It's semi-icon driven and much more than a simple shoot-em-up.

Space Doubt is CRL's latest release on the Commodore. A bit light on instructions this one, which takes the form of a humorous (sic) cartoon. The message seems basically to avoid the Bogloids.

Wreckless Roger Wilco (or Woger to his friends) is the hero of a new game from budget software house Blaby games. £1.99 of mindless violence is promised here as Roger tries to rebuild his spaceship and generally reek havoc. Blaby are on 0533 773641.

Realm of Impossibility marks another conversion to the Spectrum of a classic title from Electronic Arts via Ariolasoft. It looses a little in the conversion – especially onto cassette, but is nevertheless a good 3D platforms and ladders type game. Interesting two player mode. An Atari disc version is also now available.

Flight of fancy

Mirrorsoft has converted its WWII flight simulator Spitfire 40 onto the Amstrad and Spectrum. You can battle your way up through the ranks of the few. Nice instrument panel detail. For adventure freaks, Alternate Reality from Datasoft is a two disc game for the CBM64. Set in the City of Xebec, it is firmly in the role playing tradition with graphics and multiple characteristics.

The QL has at last got its own flight simulator. Microdeal have brought out a program which simulates a light plane flying in any of eight different types of terrain. All the usual controls but the graphics are a bit basic.

TLL, a very successful program on the Spectrum has been converted for the Spectrum by Vortex. Your bomber skims over the landscape scattered with building, trees and pylons.

Spectrum hack

Hacker, the enigmatic game from Activision has hacked its way to the Spectrum. Invade a computer network and save the world.

British Telecom seem to sprouting new labels like they were going out of fashion. Firebird have a new label, the Hot Range. The four games released are all for the Spectrum. Gerry the Germ Goes Bodypoppin' is a jolly little program about giving someone a nasty cold. You have been many things playing a computer game before, but never a germ!

Rasputin is an isomorphic arcade adventure. Nice graphics, demanding and flexible game play make this possibly the best of the hot range bunch. Runestone is an illustrated adventure. Realtime, multi character control is on offer, as well as the ever present orcs. Casta Capers brings up the rear in the Hot Range and is another attempt at the old "A Strange Thing happened to me on the way to the Beach Party" genre.

Golden Talisman comes from Mastertronics new MAD range of up market budget software. You have to piece together the Talisman and then lay it on the nasty old Whiz. Another in the inexhaustible supply of arcade adventures for the CBM64. From the same people, for the same machine in their 199 range comes Nonterraqeous. Watch your psyche as you battle through 1000 screens to stick the boot in to the runaway computer.

The Causes of Chaos from CRL incorrectly claims to be the first multiplayer adventure game (remember The Prince). You and up to five of your mates must retrieve five jewels from an underground labarynth. Cause chaos on your Commodore.

Amstrad tau ceti

CRL has also been hard at work on its well received game Tau Ceti. An Amstrad version is available, and soon an improved Amstrad disc version with some extra features. Called Tau Ceti Plus, it should be out "any day now".

Also on the Amstrad, Artic have an arcade adventure called Obsidian. A spot of spanner work on the old spaceship is required. Fail, and you naturally face instant death by falling into a black hole.

Amsoft have released Macrocosmica on their Gold label. 10,000 planets out there to be traded with. All a bit Eliteesque without the good bit (i.e. the 3D vector graphics). Also on offer from Amsoft is an arcade adventure Doors of Doom. And if you don't like the scenery, there is a design your own section. Lots of things to zap and objects to play with.

Still on the Arnold, PSS has converted its controversial program Theatre Europe. Now you too can start a nuclear winter from the comfort of your favourite armchair.

Yet another game to get the Amstrad habit is Think from Ariolasoft. This is an intruiging variation on the Connect 4 type game. Icon driven with very pretty graphics, for one or two players.

Gremlin Graphics has released two games for the Atari. King of the Ring is another in the current spate of fight programs. This takes a slighly different approach in that you play the manager. Far safer, and with no risk of cauliflower ears, you instruct your boy and fix up fights for him. Zone X is a spaced shoot-em-up.

Hunting spys

Another Atari release is Spy Hunter. From U.S. Gold, this is an excellent implementation of the arcade hit all about dealing with badies on road and at sea in a fast, scrolling shoot-em-up. Dragon Skulle is the first release from the new tie up between U.S. Gold and Ultimate. For the Commodore, it concludes the Sir Arthur Pendragon Trilogy and is set on a desert island where you must vanquish the evil Skulle and its accolytes. Not as hot as many of the Ultimate Spectrum hits last year, but still not bad.

On the licensed game front comes Play Your Cards Right from Britannia on the Spectrum. Only for absolute fanatics of the program. It just ain't the same without ol' Brucie. Another one on the tie up bandwagon is Benny Hill's Madcap Chase from Dk'tronics. Also on the Spectrum, some of the animation is rather nice, the game itself is a bit tacky.

Mirrorsoft has released The Giddy Game Show for the Spectrum. It is aimed at the under 5's, especially fans of the Yorkshire T.V. show. It's to help kids with their alphabet.

Showing its lighter side, Mirrorsoft also has a puzzle game for the BBC called Crack it Towsers. Fail to solve the puzzle and its a quick dunk in the moat.

Leisure Genius has converted its computer version of the board game Cluedo. Can you pull out the Plum? Are you past mustard?

System move

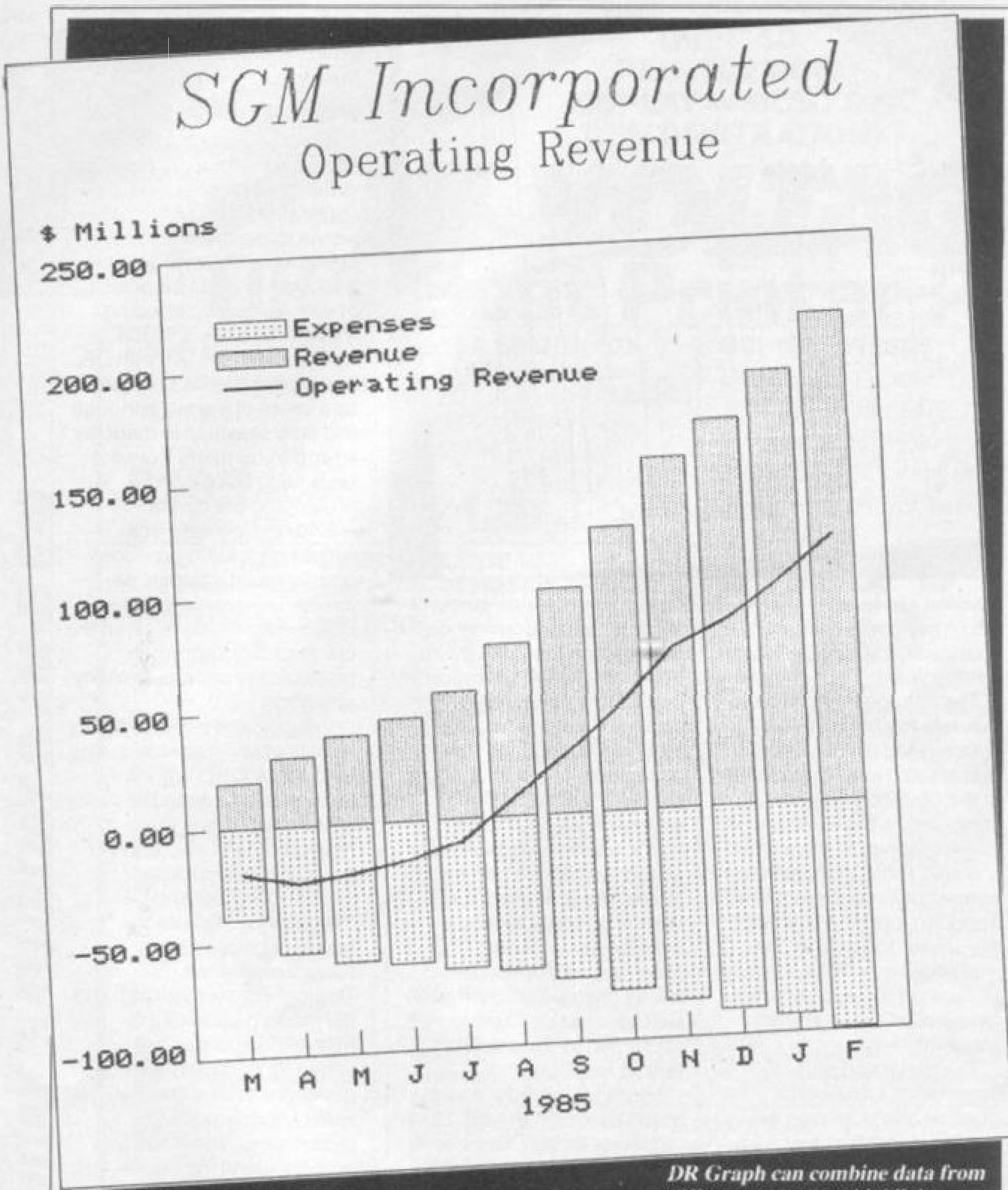
The City of London, well known as the trading and financial capital of the west, has flung open its gates and welcomed System 3 Software.

For many years the city's stock and commodity exchanges have offered up-and-coming young companies the opportunity for corporate growth and financial stability.

Many of today's major companies, yesterday's entrepeneurs, came to the city in their embryo stage to find prosperity.

System 3 Software's new address is Davis House, 29 Hatton Garden, London EC1N 8DA. Tel: 01-831 7403.

DR Graph & Draw



DR Graph can combine data from different sources to highlight inter-reactions.

DR Draw and DR Graph are both graphic application packages designed to aid in the creation of high-quality graphics. Generically, neither product is new; the implementations for the Amstrad range of CP/M computers have only just become available, however, and it is with those releases that this review is concerned.

The two graphics packages are supplied with installation instructions for both the CPC6128 and PCW8256 computers. We chose to test both in a PCW8256 environment; with some minor exceptions, however, both DR Graph and DR Draw will perform in a similar way on the CPC6128.

The manual detailing installation of the software is in both cases a slim tone designed to cover those details of the packages specific to owners of Amstrad computers. The instructions relating to the PCW8256 machine ensure that effective use is made of the machine's RAM disc. That simplifies the installation process, minimising the number of disc swaps required on a standard single disc system, and makes further use of the RAM disc to hold overlays during use of the software; that again ensures that disc swaps are kept to a minimum.

Having installed the programs, they are called by the CP/M instruction Submit, followed by the name of the applications package to be used. The Submit file prompts for the users to insert side A or B of their work discs as appropriate and during the set-up process the screen shows that the system is copying a series of overlays to drive m:, the RAM disc. To ensure correct operation the RAM disc should contain no files at start-up. The user is asked to confirm that all information in drive m: should be erased as the first stage in the start-up sequence.

The manuals describing the operation of DR Graph and DR Draw are models of clarity and presentation which many other software vendors would do well to emulate. Both begin with an extensive getting started section which introduces the user to the basics of the applications facilities. That section is followed by a comprehensive guide to the many advanced features offered by both packages.

Drawing board

The detailed operation of the packages differs and it is DR Draw that is described first. Operation of DR Draw is controlled via a series of menus and sub-menus selected by positioning the cursor over a series of boxes drawn across the top of the computer screen. While some implementations of the application may be controlled by a mouse, in the case of the PCW8256 it is the four cursor control keys which control the position of the cursor. When the cursor is positioned over the box corresponding to the instruction to be instigated, the space bar is used to 'Pick' the function.

The first step in using the system is to create a new picture file. The system will prompt for a file name, after which the screen will clear before being replaced with a new set of menu instructions and a work grid consisting of a grid of dots with a cursor at its centre. The grid acts in the same way as the lines of graph paper, making sure that the various elements of the graphic created by the

(continued on page 22)

DR Graph & Draw

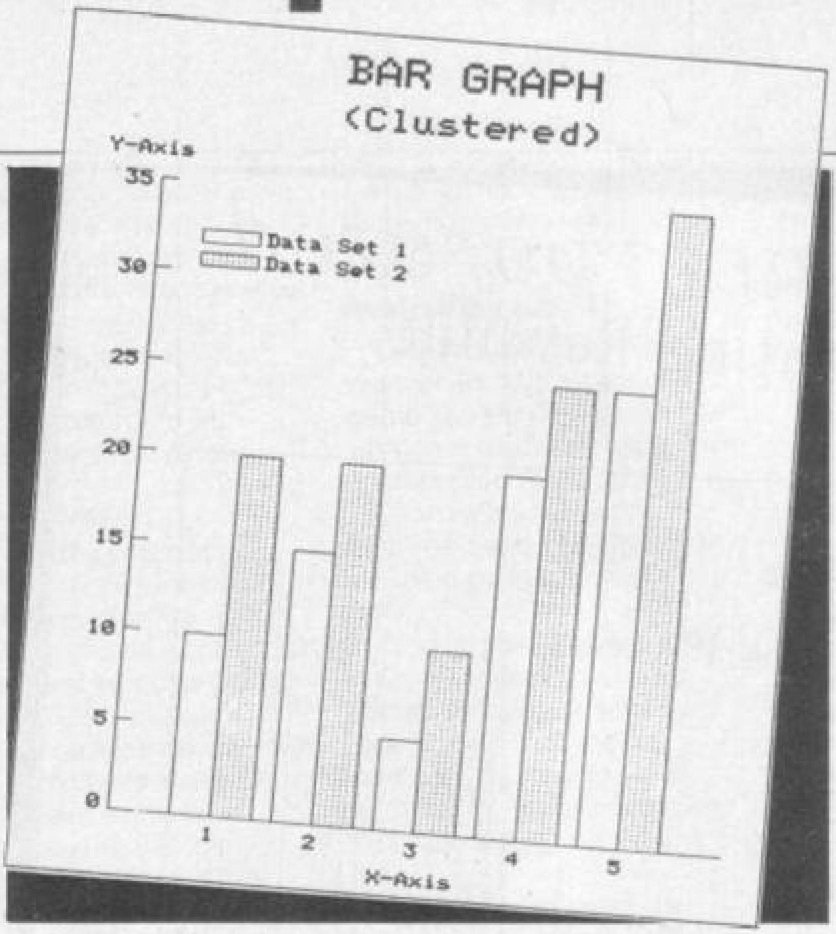
(continued from page 21)

program are in square.

The 'Add' and 'Change' commands are the first to be used when creating a new drawing. When selected, both present a comprehensive sub-menu from which the specific action required is selected. The 'Add' command allows a comprehensive series of shapes to be created by the user. They include lines, boxes, circles and the ability to enter text. When entering a shape to the grid, the first step is to select the point at which it is to be placed by movement of the cursor, followed by a press of the space bar to confirm the position.

In normal operation the point will 'snap' to the nearest grid point and use that as the start point, to keep things in square, although that facility can be disabled by way of the change menu. When adding text, the default condition is to use the machine font. DR Draw, though, provides a range of alternative fonts which, because of the way the system treats text, should be used in preference to the machine font.

When entering text, the return key is used to indicate that a line text is complete. The return key must be pressed again to return to the edit menu. When the enter key is pressed for the second time it is acting as the DR Draw 'Done' key. While that dual function allocated to the return key could cause confusion, the manual makes its use clear.

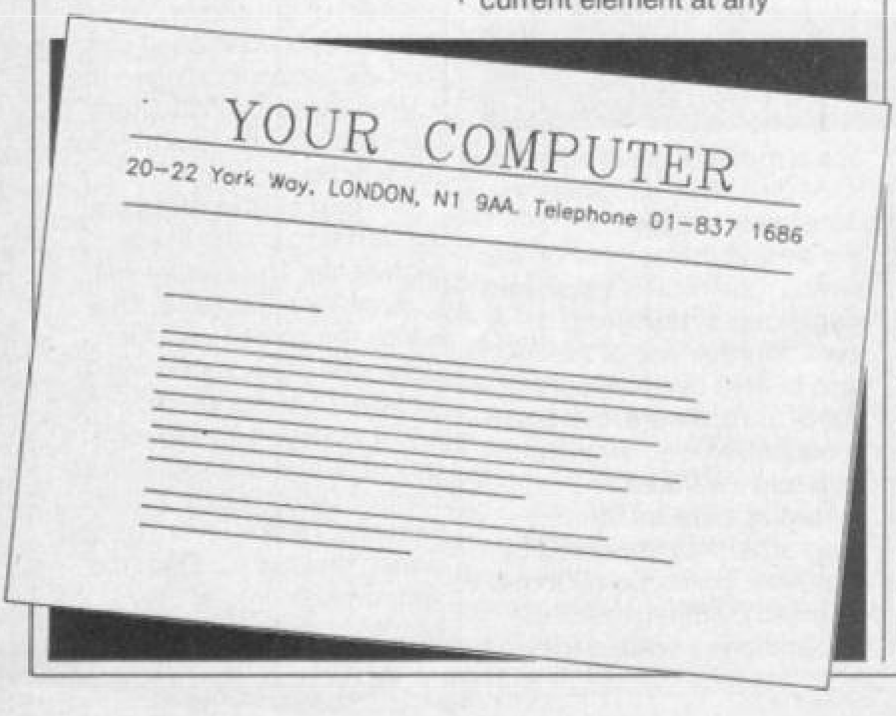


The change menu allows the user to alter the appearance of the current system element. The concept of the current element is important to DR Draw and is fully-explained in the system manual. The current element normally will be the last one added to a design, although the select option from the main edit menu allows any element of the system to be designated as the current element.

The move and copy commands are used to position and duplicate the current element at any position on the work screen. A set of powerful commands, selected via the page menu, permit the presentation of the output to be configured in a variety of ways. The output may be either upright or landscape. The view function provides a means of previewing output to ensure that it is within the borders associated with a particular format. A particularly useful command associated with the view facility is 'Zoom Full Out'. Selecting that option will cause the graphic created by DR Draw to size itself according to the selected output format.

Having finalised a design, pressing the enter key, which functions as the Done key in many DR Draw commands, the user is returned to the main menu. That allows the work to be saved; in general, DR Draw files are best saved to a blank disc as they occupy a considerable amount of space. The optimum way of using the system involves copying the font files from the system disc to a picture disc. That maximises the space available for picture files and removes the need for disc swapping.

The output command, selected from the main menu, activates the printer and produces a hard copy output of the finished graphic. That can take up to 10 minutes to produce with the PCW8256 printer.



Graphic illustrations

While DR Graph matches DR Draw in terms of power, by virtue of its more specific application, it requires fewer words to describe its operation. DR Graph is designed to produce graphs of various forms, including line, bar and pie, with the minimum of fuss. As with DR Draw, operation is controlled by a series of menus, although this time selection is made by keying-in numbers from the keyboard rather than positioning the cursor.

Entering the data from which the system produces graphs could scarcely be easier. The entering and positioning of labels, often the cause of difficulty when producing graphs, is similarly straightforward.

It is perhaps a tribute to the ease of use that so little can be said about the program. All the comments as to the clarity of the instructions made in respect of DR Draw apply equally to this package.

Both DR Draw and DR Graph allow areas of the graphics created to be assigned different colours. That option does not apply to the mono display of the PCW8256 and was not tested. In addition, both packages can be used with a variety of printers and plotters, assuming an appropriate driver. Again that facility was not tested.

While the DR graphics application packages may seem rather expensive if you are used to spending £10 or so for a software product, in CP/M terms the software is very much in the budget price category. A budget price, though, does not mean an inferior product. We can recommend both to users of Amstrad CP/M machines with a requirement to produce presentation quality figures and graphs without the headaches so often associated with that type of work.



UK's Best Printer Prices

OPEN MONDAY-SATURDAY 9 AM-6 PM

KAGA TAXAN KP810
NLQ Dot Matrix Printer
160 c.p.s.
£199.95 + VAT
IBM version £239.95 + VAT

STAR GEMINI 10X
Dot Matrix Printer
120 c.p.s. + Friction & Tractor, Epson Compatible.
£129.95 + VAT

UCHIDA DWX305
Daisywheel Printer
18 c.p.s. With FREE: Printer Cable,* Extra Ribbon, 500 Sheets of Paper and Tractor Feed (worth £69)
£199.95 + VAT

ATARI 520ST OFFER
Buy an Atari 520ST complete for £749.95 inc VAT. (£652.13 + VAT) and we will sell you a STAR GEMINI 10X Printer for an incredible
£24.95 inc VAT
(£21.70 + VAT)

ALL PRICES EXCLUDE VAT
All equipment fully guaranteed — Credit terms available

DOT MATRIX PRINTERS

Brother HR5	£78.21
Brother M1009	£130.40
Brother EP44 Typewriter	£189.90
Brother TC600 Typewriter	£359.90
Brother 1509 NLQ	£419.90
Epson P40 Thermal AC/DC	£49.90
Epson LX80 NLQ	£199.90
Epson GX80 NLQ	£199.90
Epson FX85 NLQ	£369.90
Epson FX105 NLQ	£479.90
Epson LQ800 NLQ	£499.90
Epson JX80 Colour	£449.90
Canon PW1080A NLQ	£269.90
Canon PW1156A NLQ	£365.90
Panasonic KP1091 NLQ	£255.90
Oki-Mate 20 Colour	£199.90
Shinwa CPA80 plus NLQ	£159.90
Micro P. 165 NLQ	£199.90
Seikosha GP50S (Sinclair)	£69.90
Seikosha GP500A	£89.90
Seikosha SP1000 NLQ	£199.90
Seikosha SP1000 VC NLQ (CBM I/F)	£217.34
Seikosha BP5420 (420 CPS)	£1099.90
Smith Corona Fastext 80	£110.90
Star SG10 (IBM) NLQ	£199.00
Star SG10C NLQ (CBM I/F)	£217.34
Star SG15 NLQ	£329.90
Star SD10 NLQ	£329.90
Star SD15 NLQ	£409.90
Star SR10 NLQ	£399.00
Star SR15 NLQ	£499.00
Kaga Taxan KP910 NLQ	£379.90

DAISYWHEEL PRINTERS

Brother HR10	£249.90
Brother HR15 (P)	£315.00
Brother HR25	£609.00
Brother HR35	£739.90
Daisystep 2000	£219.90
Juki 6000	£199.90
Juki 6100	£299.90
Juki 2200 Typewriter P or S	£229.90
Commodore DPS1101	£165.17
Uchida DWX 305	£199.00

All popular interfaces, cables, etc. available from stock. Custom cables made to order.

Let our experts match your computer to the printer of your choice.

Printers — All models parallel-centronics interface Serial RS232C available at same or slightly higher prices.

MONITORS

Microvitec Colour

1431 DS STD RES RGB	£182.53
1431 MZ STD RES Spectrum	£199.90
1451 DS MED RES RGB	£229.90
1451 DQ MED RES QL	£229.90
1451 APDS MED RES	£289.90
1441 DS High RES RGB	£389.90

Philips Monitors (Monochrome)

BM7502 Green	£73.90
BM7522 Amber	£78.90
BM7542 Paper white	£85.90

Philips Monitors (Colour)

CM8501 RGB STD RES	£181.90
CM8524 Comp/STD	£225.90
CM8533 RGB/IBM/MED	£251.90
1114 Monitor/TV	£173.90

COMPUTERS

Amstrad

PCW8256	£394.90
FD2 1 Mb Second drive	£149.90
CPS Serial/Parallel I/F	£59.90
Full range of business software	PHONE
CPC6128 Green Monitor	£252.13
CPC6128 Colour Monitor	£339.09
FD1 Second drive including cable	£92.90
DMP200 NLQ Printer	£139.90
MP2 Modulator	£25.90

Apricot (monitors extra)
Special Prices Limited Stocks

F1E 256K RAM 1 x 315K Disk	£499.00
F1 256K RAM 1 x 720K Disk	£699.00
Atari 520ST inc DD + monitor	£642.90
500K ST Disk Drive	£130.34
1MB ST Disk Drive	£173.82
ST Colour Monitor	£343.40
ST 10MB Winchester Hard Disk	£429.48

BBC

New Master Series	PHONE

Commodore

CBM 128/CPM Compatible	£226.04
CBM 128D inc 1571	£426.04
CBM 128D + Monitor	£489.90
CBM 1570 Disk Drive	£169.52
CBM 128 + CBM 1570	£382.53
CBM 1571 Disc Drive	£229.90
CBM 64	£130.39
CBM 1541 Disc Drive	£121.70
MPS 1000 NLQ Printer	£217.34
1701 Colour Monitor	£165.20
1901C RGB Colour Monitor	£251.90
PC10 IBM Comp. Green	£1149.90
PC10 IBM Comp. Colour	£1549.90
PC20 IBM Comp. Green	£1699.90
PC20 IBM Comp. Colour	£2099.90
All PC's inc. Micropro 'Easy' WP	FREE
Commodore Amiga	PHONE

Sanyo

MBC 555 128K 2 x 160K	£679.90
Sinclair QL	£169.52
Spectrum PLUS	£95.60

SUPERDISKS per box of ten
Add 70p for P&P per order

	SSDD 40TR	DSDD 40TR	SS96TP1 80TR	DS96TP1 80TR
BASF 5¼"	£10.00	£15.80	£17.50	£19.20
3M 5¼"	£13.50	£19.50	£19.90	£23.90
VERBATIM 5¼"	£12.20	£15.20	£15.20	£19.90
DYSAN 5¼"	£13.75	£18.00	£18.00	£23.90
TDK 5¼"	£15.90	£14.50	—	£29.50
SONY DS/DD 3½"		£32.90	MAXELL 3"	£34.77

PRINTER RIBBONS
Single prices, deduct 10% for 5+

Brother HR15 Corr	£2.90	CBM 1525	£4.50	Kaga KP810	£9.50
Brother HR15 MS	£5.50	CBM DPS1101 MS	£3.80	Mannesman MT80	£6.50
Brother HR5	£2.90	Daisystep 2000	£3.90	Seikosha GP50	£6.90
Brother EP44	£2.90	Epson MX/RX/FX 80	£3.50	Seikosha GP100	£4.50
Brother M1009	£3.90	Epson 100 Series	£4.50	Seikosha GP500	£6.90
Canon PW1080A	£9.50	Juki 6100 SS	£1.90	Seikosha GP700	£18.50
CBM 801	£6.90	Juki 6100 MS	£3.80	Shinwa CP80	£6.50
CBM 802/1526	£6.50	Juki 2200	£3.80		

Mail Order + Export + Trade Hot Line Phone 01-686 6362

Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

VISA

Send off or order by 'phone quoting your Access, Barclaycard No. 'Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance. Or you can Telex your order on 946240 Attn 19001335

ALSO VAST RANGE OF DISK DRIVES, JOYSTICKS, DISK BOXES, INTERFACES, SHEETFEEDERS, ETC.

HI VOLTAGE 53-59 High Street, Croydon, Surrey CR0 1QD.

Prices correct at copy date. Subject to change without notice due to currency fluctuations etc. E. & O.E.

OPEN MONDAY-SATURDAY 9 AM-6 PM

Hardware hitlist

Epson has long been well-known for its high-quality dot-matrix printers – starting with the MX and FX series on which it made its name and moving through the many letter-quality jobs on which it makes much of its current money.

Late last year the company moved to update the ageing FX and MX ranges with the introduction of new FX machines (the FX-85 and FX-105) and a new low-cost model, the GX-80. We've already told you about the new GX machine *(Your Computer*, December 1985), so you might be interested in more on the FX range – specifically the wide-track FX-105.

The first thing that you should know about it is that it's not cheap – at £654 the FX-105 is a substantial investment for any micro user and should be considered very carefully. It does, however, offer a pretty impressive range of features.

The extra-wide platen is perfect for printing spreadsheets, ledgers and pre-printed forms, while the hardware-driven Near Letter Quality printing mode makes it an attractive vehicle for writing business letters which don't look as though they've been written on a computer. The Near Letter Quality is made possible by a new Epson print head – which increases print density from a 9 x 9 matrix to an 18 x 18 matrix in NLQ mode.

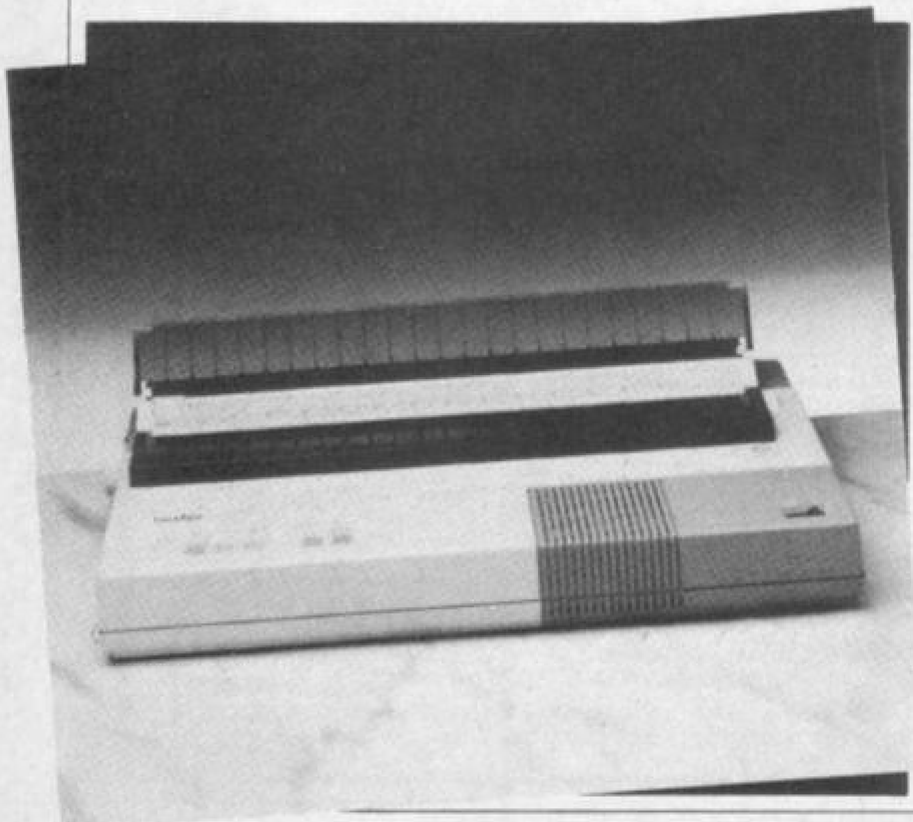
The FX-105 also offers a choice or tractor or cut-sheet feeding – giving you a choice of paper and seeming to eliminate some of the 'paper-chewing' habits of the MX range. DIP switches are also easy to set (although they don't pass the 'screwdriver test' – one is still required to get at them) and are located beneath a cover at the top of the machine.

Speed is impressive – 160 cps (Characters Per Second) in draft mode and 32 cps in NLQ. The latter rate is still a good deal faster than many high-speed daisywheel printers.

An 8K on-board RAM buffer gives you a de facto print-spooling system and space in which to store your own user-definable characters – including perhaps a standard letter-heading or your own graphic design.

Speaking of graphics, the FX-105 is pretty good at printing them. Eight different modes allow densities from 60 to 240 dots per inch. These graphics can also be combined with text within a document.

The FX-105 is certainly a machine which lives up to the Epson reputation and heritage – but unfortunately also lives up to the old Epson price. Unless you need the higher speed or the wide carriage, you should probably be looking at the sub-£500 Epson GX-80 or at one of the many Epson compatibles currently available.



One of the biggest decisions which faces anyone considering the purchase of a printer is whether to opt for dot-matrix or daisywheel technology.

Dot-matrix printers are usually cheaper, and offer higher printing speeds and a variety of easily accessible typefaces. The quality of print is inevitably poorer than the average daisywheel printer – although the availability of 'Near Letter Quality' modes on some modern printers has slightly alleviated this problem.



Daisywheel printers, on the other hand, produce high-quality typewriter-style print (indeed many daisywheels can be used as typewriters with the addition of an add-on keyboard) and offer a huge variety of typefaces – although they are difficult to access because you must physically change the daisywheel on the print-head. Daisywheel printers are often used by people who don't necessarily want the person receiving their letters to know that they were produced on a computer (such as those writing hundreds of personalised 'form' letters).

A difficult decision, but one which you may no longer have to make. Brother, one of the leading Japanese manufacturers of printers, typewriters, calculators, sewing machines, etc. has now come up with a printer that incorporates *both* dot-matrix and daisywheel printing technology.

The resulting machine is known as the 'Twinriter' – a big, powerful printing beast with two print heads and a control panel which looks as if it would be more at home in the cockpit of a 747 than sitting beside your micro.

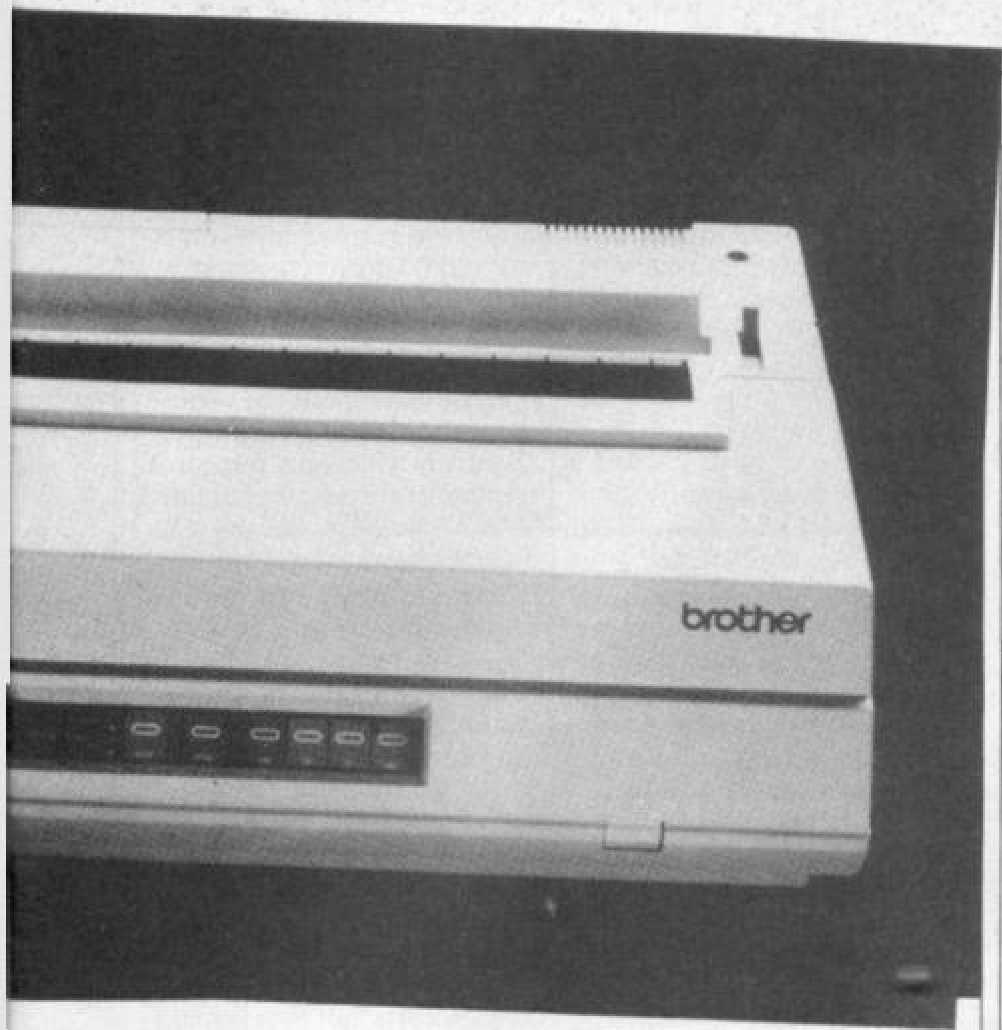
According to Brother, 'the Brother Twinriter 5 (Model HR-35DD) is an innovative combination – a two-in-one daisywheel/dot matrix printer. The two print elements are installed on a single carriage, offering the best features of both – high resolution graphics in six selectable densities can be mixed with letter quality text in the same document.'

In short, the machine is not simply an el cheapo daisywheel with a poor quality dot matrix head strapped on top of it. The print heads can, in fact, even operate together on the same line when non-standard characters are Near Letter Quality (NLQ) printed with the dot matrix to complement the main Letter Quality (LQ) printout from the daisywheel.

Graphics printing is also excellent so that, for example, you can print a business letter from VIEW on your Beeb and then switch into the AMX mouse painting software and print some dot-matrix graphics to go along with it.

During our test, the Twinriter performed faultlessly – switching from daisywheel text to high-resolution dot-matrix graphics with ease. It was also surprisingly quiet in its daisywheel mode (Brother rates it at under 60 Db) and the speed was respectable (between 30 and 36 cps, depending on which daisywheels you're using).

The dot matrix printing is ironically slower than the slowest daisywheel operation when Near Letter Quality



mode is used (although I personally can't see many reasons for using NLQ mode when daisywheel printing is available to you) – churning text out at only 17 cps. Ordinary Epson-compatible 'draft' printing, however, is a far more respectable 140 cps.

The printer is supplied with a parallel interface, although a serial interface is available as an extra option. You should have little trouble connecting it to your micro – we tried it with both a BBC micro and a QL without any problems. DIP switch settings for line feeds, form feeds, line spacing and other esoteric preferences are easily controlled by a bank of switches at the back of the printer. The Twinriter passes the 'screwdriverless DIP switch setting' test as no covers, panels or other bits of plastic have to be removed to get at them.

There are, however, three banks of DIP switches – each assigned to cover different tasks. One controls the settings for the optional serial interface (baud rate, data bits, parity, etc.), another the character sets (for both daisywheel and dot matrix operation) and the third decides which modes will be the 'default' setting.

Also at the back is a DIN plug for either a cut-feed or tractor-feed mechanism. Our review model came without either of these, and seemed to suffer from slight paper 'drift' as a result.

On the whole, however, I can think of no reason not to recommend the Twinriter 5 – except for the (ouch!) price. At £1295, it is not really the sort of machine which is budgetted to sit beside your Spectrum or Amstrad CPC – but it does portend a far more flexible future for printer buyers.

The daisy difference

The two printers featured here both offer an impressive performance but equally they are rather expensive.

Unless you have an immediate requirement for the up-market specification offered by the Epson FX-105 and Brother HR-35DD our advice would be to wait awhile.

The price of printers is set to fall dramatically during 1986 – there are going to be plenty of bargains around later this year.



In brief

When it comes to the selection of a joystick, it is personal taste, rather than technical specifications that determine the model that is best suited to a particular person. The Gravis MK VI 'stick manages to combine an impressive technical specification with, in the opinion of the staff around the YC offices, an action that is well suited for playing the most aggressive of arcade shoot-'em-up games.

The control stick is formed from a large, metal reinforced, padded foam handle which has a sculptured fire button built into its top surface. A further two buttons are mounted on the base of the units. All of the buttons have a positive 'click' action and fall easily to the fingers of the user.

An adjustable centering spring allows the joystick to have either a self-centering action or a free non-return action – this latter action being more suited to those using the joystick in place of a mouse with, for example, paintbox software.

The joystick is available as either a switch type, suitable for use with Atari style joystick ports or as an alaogue stick for use for computers that feature an A/D convertor as does the BBC micro.

The Gravis joystick is manufactured in the States and is available in this country from Teknacron Circuits Ltd., Landguard Manor Road, Shanklin, Isle of Wight, PO37 7LH.

Low cost print

The price of daisy wheel printers looks set to follow those of dot matrix types in a downward spiral that will mean some real bargains for the computer user. One such low cost letter quality printer is the model PR3000 from Sanyo. At £199 plus VAT the printer offers a specification that includes bi-directional printing at 10 cps. The high definition output of the printer is achieved by the use of an inked roller. Maximum print width is 6.7 inches and the printer can be set to operate at either 10 or 12 characters per inch. With 12 cpi selected, it is possible to print 80 columns of text. Paper feed is by means of a friction roller at a pitch of 1/6 inch.

The PR3000 features a Centronics type parallel interface and offers a full complement of 91 characters. Switches are available to change pitch and to produce test outputs.

The PR3000 should be available from your local Sanyo stockist, in case of difficulty contact Sanyo at Sanyo House, Otterspool Way, Watford, Herts, WD2 8JX.

Bare essentials

When faced with the task of stripping the insulation from a length of cable, how many of you have resorted to biting through the cable with your teeth? Assuming that the majority of *Your Computer* readers are honest people the answer in most cases will probably be yes. While this sort of thing may be good news to the dentists of the country, it does not bode well for the continued good health of the teeth of YC readers. To answer this problem is to use Plasplugs new Automatic Wire Stripper which will cut and strip the insulation from single, twin or multi-core cable. At just £3.95 you could say the stripper was a snip – it is available from all good DIY stores.

Gold blocked in local access move

Disturbing rumours reach our ears concerning the scotching of a deal whereby Telecom Gold and other services would be available via the Prestel local call network.

That local call access for Gold is the cherished brain-child of Richard Hooper, boss of British Telecom Value Added Systems Services, and hence in charge of Prestel, Telecom Gold and various other odds and ends of VAS networks.

Hooper had the idea of co-opting Prestel's cherished local call access nodes, which give it the potent advantage of local call rates to 98 percent of telephone users, and opening it to Gold and the rest of his portfolio of services.

Prestel hit the roof. Local call nodes are Prestel's biggest single market advantage and Telecom Gold is its biggest single market rival. The notion of the one sharing the other caused near apoplexy at Telephone House.

There was not much that Prestel could do. Hooper is the boss, so lucky punters could look forward to the day when a call to 618, or whatever, would confront us with, not the familiar Welcome to Prestel frame, but a menu offering "Key 1 for Prestel, Key 2 for Telecom Gold, Key 3 for Whatever Else We Can Think Of".

Great stuff, and thanks to Hooper for his tenacity in pushing through the idea.

Picture our concern, therefore, when a Prestel executive said recently that the whole scheme was in the melting-pot on the back burner, because of an absurd ruling by Oftel, the self-styled "telecoms watchdog".

Prestel's remit, developed by the Department of Trade and Industry and supervised by Oftel, insists that the organisation can offer only value added services; any data carried by Prestel must be altered in some way, usually, of course, by being turned to viewdata format.

According to the Prestel voice, Oftel has now decided that the transmission of Gold via the Prestel network could not qualify as a value added service, since Gold would not be altered in any way during its transmission; by carrying unamended data, Prestel would be infringing the territory of National Networks, another division of the old BT structure whose remit is the provision of lines for straight data transmission.

Oftel insists that negotiations about the joint network are still proceeding but avers with equal force that Prestel's role must be confined to VAS services, and the DTI says the same thing.

Our understanding, though, is that talks are delayed regarding the issue of precisely what Prestel has to do to add value to Gold. "Perhaps a purple colour code in front of every second word," says the Prestel man.

Oftel should be careful. Its reputation as a guardian of the punter against the might of BT is at risk over this issue. Its job is to improve services and reduce costs, not to safeguard restrictive practices and self-serving demarcation lines.

Teletext challenge the wires

The big comms news of the month has nothing to do with telephone lines; the maturing plans of Oracle and Ceefax teletext services to begin data distribution soon look set to pose an increasing challenge to established wire-based services.

Teletext, as you are doubtless aware, is a means of transmitting screens of information to suitably-equipped TV sets using spare lines at the top and bottom of the conventional TV picture.

At present, the information is limited to the familiar racing results and forthcoming TV shows but Oracle and Ceefax have long been wrestling with their respective controlling legislation to find a means of using teletext to send data to private, commercial subscribers.

Oracle has now made a deal with Air Call while Ceefax are going their own way.

All that the teletext companies want now, they inform us secretly, is for TV manufacturers to reduce the surcharge they add to sets for the inclusion of a small amount of teletext circuitry.

Page 3 'phone-up is 'mild'

Readers of *The Guardian* must have choked on their muesli and orange juice recently to read about 25-year-old Michelle, "blonde, long legs in fishnet tights, your very own personal page 3 phone-up", who is willing to explain all about her underclothes to casual callers.

Your Computer readers may be equally interested to know that young Michelle – we can reveal that she is 17 – is the newest addition to Mainline, the dial-a-tape company pioneering non-BT exploitation of the new surcharged exchange.

Alongside less contentious subjects like Fishing Line, Laugh Lane and Chartbusters, callers in the London 01 area eager for full information on Michelle can now clock-up national B rates on the 0066 exchange for Mainline's new Red Line service.

Don't become too excited, though. Britain's first dial-a-dirty-monologue service is appropriately mild for a company looking over its shoulder at BT and its own avowed Radio 4 standards.

Much more significant for serious folk is that Mainline is a subsidiary of East Midland Allied Press, publisher of computer magazines and the brain-child of Tim Schoonmaker, whose other hat, also EMAP issue, has Boss of Micronet 800 written inside it.

Curse of the VTX – part 3

The curse of the VTX seemed to have decended on Modem House last month with the news that a receiver had been appointed to its trading division, DTMC.

The jinxed VTX5000 modem had previously seen off manufacturers OE Ltd and distributor Prism, and unsold stocks acquired from the Prism receivers by Modem House seemed to have planted their kiss of death on the Bristol-based modem distributor.

The DTMC receivers reckon they will be out by the time you read this, with the division back on its feet, and Modem House boss Keith Rose is being bullish on our telephone lines with almost daily announcements about new products and distribution deals.

Most notable is his appointment as exclusive distributor for the GEC range of modems, due to "an unrivalled range of comms software, proven record of success, and access to retailers unmatched by any modem company".

The GEC deal might be satisfactory for Modem House high street credibility but the two companies need new products if they want to expand in our end of town, their best so far being the over-priced Datachat modem, whose only claim to fame is its gimmicky power input from the telephone line.

COMPETITION Battle of the Planets



Your Computer proudly presents your chance to enter the 1986 National Computer and Video Games Championship.

If you have a Spectrum or an Amstrad, return this entry form to our office by the end of March.

The first 100 entries picked out of the hat will each receive a free copy of Micro-Gen's new game Battle of the Planets and also a chance to enter the Championship.

From these 100 entries, one champion will go forward to represent the magazine in the next section of the championship. He, or she will be the player who gets the highest score by the closing date. The scores will, of course, be accompanied by a code which will allow Micro-Gen to verify your score. Do not forget to specify which of the two machines you have.

BATTLE OF THE PLANETS COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your entry to Battle of the Planets Competition, *Your Computer*, Suite 4, 20-22 York Way, London N1.

Name ....

Address ....

....

COMPETITION RESULTS

In the January issue we had a competition in which you could get your hands on a Sanyo midi stereo system and the Harvey Smith show-jumping game.

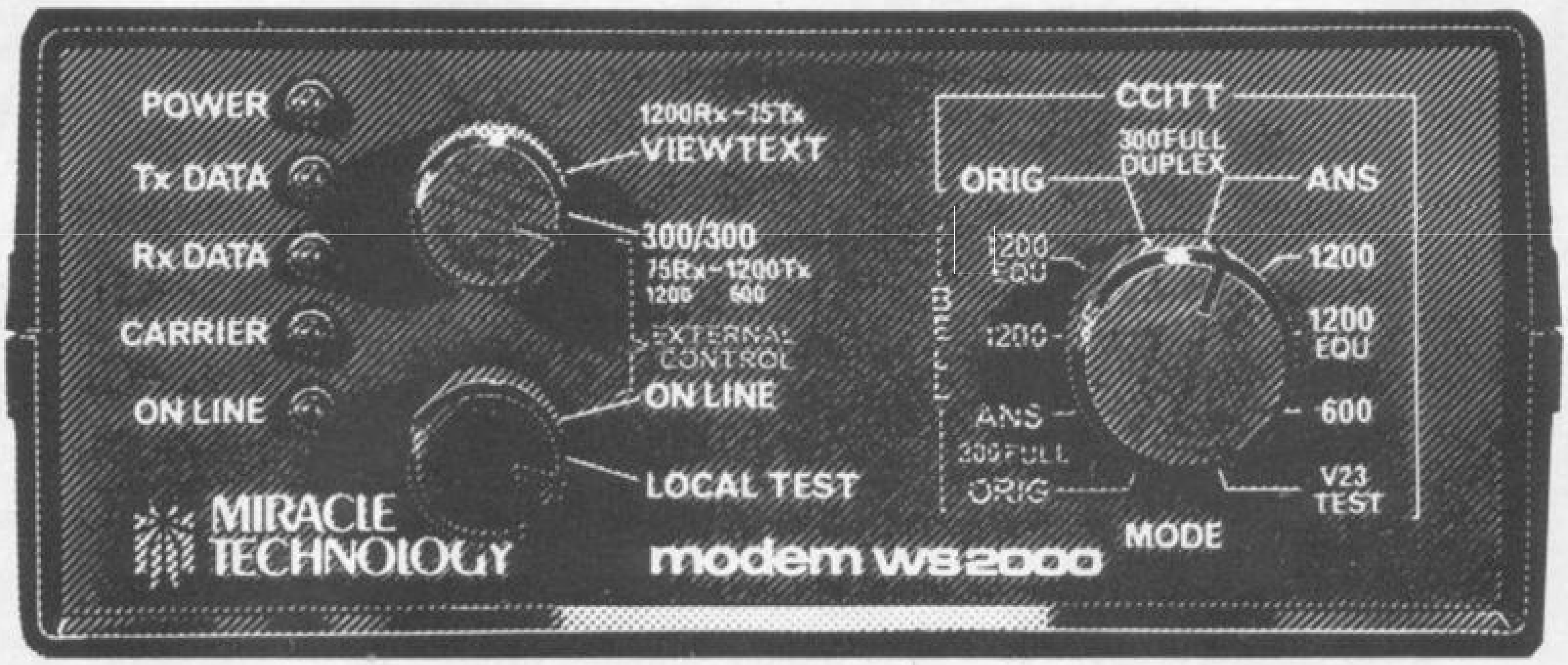
There was the Sanyo system for the lucky winner and Harvey Smith's show jumping games for 30 more runners-up

We asked you to design an obstacle computer game, with the aid of whatever documentation thought necessary. Even if some of the diagrams were somewhat abstract, the response was really considerable, ranging from events involving the 'try loading the cheap cassette successfully' event to the 'try typing the game into your computer and running in successfully'.

First prize goes to Paul Skittlehouse of Hull. His entry pitted three well-known computer personalties in a race over a computer obstacle course – Jeff Minter, Clive Sinklayer and a ZX-81 saved from the scrapheap just for this event. Skittlehouse shows his Commodore allegiance; Minter wins by a clear llama's head.

The runners-up are: Emma Van Rixtel of Colchester, Essex; Graham Fitter of Hassocks, West Sussex; Martin Fawcett of North Bransholme, Hull; A. Keill of Coventry; Peter Luckham of Fallowfield, Manchester; David Miguel Martins Soares of Monte De Caprica, Portugal; Darren Callaghan of Leigh; Stephen Lenham of Old Coulsdon, Surrey; Mark Allan of Redcar, Cleveland; Martin Roberts of Burgess Hill, West Sussex; Darren McSweeney of Barrow, Cumbria; P. G. Soundy of Kinloss Foress, Scotland; Martin Hatton of Whalton-Moreth, Northumberland; Adrian Alldriok of Stoke, Coventry; Iain Scott of Chippenham, Wiltshire; Mike Ciddor of Milton Keynes, Buckinghamshire; Mora Frederic of Martigues, France; Sirfraz Jamil of Warrington, Cheshire; Andrew Ennis of Herne Hill, London; Andrew Smith of Carlton-in-Cleveland, Cleveland; Stuart Whitehouse of Halesowen, West Midlands; Jonathan Temple of Chilwell, Nottingham; Steven Williams of Lundin Links, Fife; Paul Harrison of Davyhulme, Manchester; Allistair May of Moray, Scotland; Dimitris Tranoudis of Athens, Greece; G. Clark of Gillingham, Kent; Allaster Allum of Hadham, Herts; and Nicholas Roberts of Shanklin, Isle of Wight.

We'd like to say how much we've improved the WS2000 manual-dial modem.



(But as it's already the best, we've brought the price down.)

Modem WS2000 from Miracle Technology. The best manual-dial modem you can buy. Runs at 1200/75, 75/1200, 300/300 plus 600 and 1200 half duplex. Gives access to Prestel*, Micronet*, Microlink*, Telecom Gold*, telex, viewdata services, Email, databases, bulletin boards, user-user communications. So versatile, any computer with an RS232 port or interface and the right comms software can use it — from a ZX81 to an IBM mainframe. (Necessary leads and software for most computers available.) Such high quality it was a 1985 British Microcomputing Awards Finalist and is Micronet recommended. Comes with BT telephone lead, mains power supply, comprehensive manual, free introductory subscriptions to Micronet and Microlink and the full backing of our Customer Service and Technical Support departments.

* reg'd trade marks of the companies concerned

"APPROVED for use with telecommunications systems run by British Telecommunications in accordance with the conditions in the instructions for use

It's down to only £108.70

(£130.75 inc VAT & UK delivery).
To get the best for less, phone your Access or Visa order, or send your cheque/official order today.

MIRACLE TECHNOLOGY

MIRACLE TECHNOLOGY (UK) LTD ST PETERS STREET IPSWICH IP1 1XB ENGLAND
(0473) 216141 6 LINES TELECOM GOLD 79: KEY 001 (Dealerlink 72: DTB 10135)
Tx 946240 CWEASY G 19002985 PRESTEL MAILBOX 919992265

101 applications



The next time you're asked 'what use is a computer' you can suggest that the questioner gets hold of a copy of Your Computer. Over the coming months we will describe 101 computer applications – each of which could make you money.

DAVID STEWART



Put together a love of the turf and an interest in computers and in the case of 19-year-old David Stewart, you have a winning combination.

Stewart, you may remember, was the schoolboy who gave *Sun* readers a head start in 1984 by predicting that Hallo Dandy would win the Grand National. If they had listened to Radio Cleveland or checked in the *Northern Echo,* they might have done even better – Stewart predicted the first four horses past the post, in the correct order.

The amazing coup was achieved with a humble 16K Spectrum, one of a series of micros which have helped Stewart put other tipsters, still living in the age of bookies' pen and scraps of paper, in the shade.

Born into a family of racing enthusiasts, Stewart attended flat and national hunt meetings from a tender age and soon devised his method for picking winners. "It is done by assigning a ratio to each of the various factors which affect a horse's performance and then totting them up," he explains. "The secret, of course, is to find the correct ratios."

The factors to be assessed include time of the race,m the going, the course, the jockey, the trainer, the horse's weight, age, past form, and more besides.

Even performed manually, Stewart's calculations were beginning to yield satisfying results when, for his 15th birthday, he was given a ZX-81. He soon found that it took most of the drudgery out of his forecasts, although its lack of memory limited the scope of his system, hence his progression via a Spectrum to an Amstrad CPC464. His latest acquisition is the Amstrad 8256, bought, he says, because he liked its disc drive, its memory, its price and the convenience of a complete package ready to plug in and go.

As his available memory grew with each new machine, Stewart was able to store and update information on more than 17,000 horses, as well as gradually refining and adjusting his program according to its form to date. "You can always improve on your success rate," he says. "The more results you get, the more accurate the system becomes."

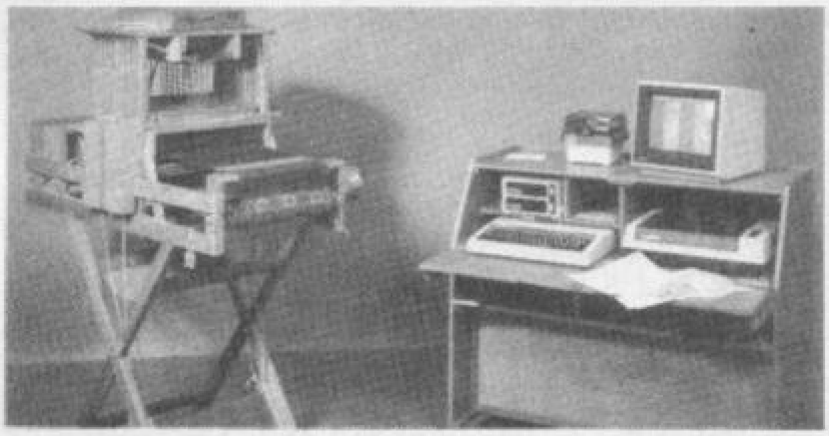
Since 1983, when he selected 1,123 winners from 1,650 National Hunt races, became known as the Computer Kid, and was billed on the front page of the *Sun* as its "amazing boy tipster", Stewart has settled into his stride. Although he never bets, he earns a reasonable living by calculating the ratings for the race cards of 12 courses, supplying tips to 10 local BBC radio stations, drawing-up the ratings for the *Sun* racing pages, and writing a regular racing preview for the Manchester-based weekly *AM Weekend.* He hopes that the last enterprise will lead to a flourishing career in racing journalism.

The sheer volume of tips he produces would not be possible without his Amstrad, Stewart says. It takes him three or four hours to work out the ratings for a single race card, which might list up to 300 horses, using his computer, and he reckons the job would take several days without it.

Nor would he get anywhere near to his average success rate of around 60 percent, twice that which most tipsters expect to achieve.

Stewart is aware that he is not the only one to have computerised his racing predictions. Without revealing any secrets, he offers the following advice to anyone wanting to attempt similar feats of clairvoyance: "Start with the simplest possible program and build on it gradually." The odds are that in spite of anyone's best efforts, Stewart will stay well ahead of the field.

BILL EMMERICH



For the last few months, students at the Royal College of Art in London, Huddersfield Polytechnic and similar establishments have been enjoying the advantages of designing fabrics with the world's first low-cost electronic dobby. Launched last July by Harris Looms of Ashford, Kent, the unit consists of a traditional manually-operated loom coupled with a BBC micro.

"The aim is to allow fabric designers to determine the pattern and texture of a fabric without going through the complex process of trying changes by hand," explains Bill Emmerich, the firm's managing director.

Until now, the method for designing a piece of cloth has remained unchanged for centuries. The designer works on a loom, each of whose shafts hold a single thread of the warp. The shafts are lifted and the cross threads of the weft are passed on a shuttle underneath. The shafts can be raised in an endless variety of combinations, altering the pattern and structure of the cloth – twill, plain, hopsack, and so on.

Normally, the shafts are raised manually for every combination the designer wants to try and then the combinations

continued on page 32

101 applications

continued from page 31

and the sequence of lifts which make up the finished pattern are recorded on graph paper.

The Harris Looms system allows designers to try the effects of changing even a single element simply by pressing the keys of a BBC micro – each key corresponds to a particular shaft. The result is displayed on the colour monitor and the designer can produce a printout of the pattern without having to make a cloth sample. The system also includes a controller and latch box so that shaft combinations and the sequence of lifts, recorded in the computer memory, can be transferred directly to the loom; the latch box raises the shafts and the designer need only pass the shuttle beneath them to weave a sample.

Hi-tech looms

"Before we launched the product, I had been working on the idea for about two years," says Emmerich. "The original calculator was based on a dobby machine so it seemed an ideal application."

Emmerich started working with a Spectrum but soon decided he needed the higher resolution a BBC could provide. Thinking he was on to something "highly original", he discovered that Dr Alan Newton was working on a similar project at the textile department of Manchester University Institute of Science and Design, using a powerful mainframe. Emmerich commissioned him to write the software for his more modest unit.

10 units sold

A complete designer unit, including a loom of up to 24 shafts, BBC micro, monitor, printer, disc drive, RS232 interface, controller and latch box costs in the region of £4,000. "Anyone who already has a loom and a BBC can link the two for only £300," says Emmerich.

So far, about 10 complete units have been sold, mostly to schools and colleges. Emmerich hopes also to interest amateur weavers and anticipates good sales overseas. "The system has brought weaving up-to-date," he says.

PETER SPANTON



A karate tournament held at Colchester last November had one exceptional feature for such an event. At the centre of the proceedings, creating order out of potential chaos, was a TRS-80 computer.

Adding to the distinction of being one of Britain's leading karate instructors, Peter Spanton is the only head of a karate association to have computerised both its administration and the running of its competitions. As well as helping to link modern technology with ancient oriental tradition, his system could pave the way towards making karate a sport accessible to a far wider following than it enjoys today.

Since he first bought a computer in 1981, Spanton has, with the help of a friend and programmer, assigned a variety of taks to it. The main one is to carry the records of Higashi Karate Kai, his association, and its 2,500 members. One special feature is related to the fact that all karate practitioners are obliged to possess a licence, not authorising them to use their bare hands as deadly weapons but providing insurance cover, registering them with the national governing body, and contributing funds to whichever association which they belong.

As well as recording each member's name, sex, grade and other such details, Spanton's database also includes licence expiry dates. A regular check enables him to identify all lapsed licences and send reminders, on forms printed-out by the computer, and thus ensure that all Higashi members are properly insured and fully paid-up.

A smaller, separate database is reserved for black belts and serves mainly as a mailing list for that elite of the Higashi hierarchy. There is also a general club mailing list and a simple accounts program.

There is nothing very remarkable in that but Spanton is particularly proud of the competition program, which does several clever things. The first is to check the entire input of contestants and eliminate those with health problems and those whose licences have expired.

"We sometimes take £150 in licence fees on the day of a competition," says Spanton with some satisfaction. Next, the program sorts entrants into their various categories – women, men, juniors, fighting, formal display, about 12 in all. For the fighting events, it then allocates contestants to pools and areas and details a fighting order which ensures that no two fighters from a single club meet in the early rounds. It then prints-out an elimination sheet on which names of winners are entered for each successive round.

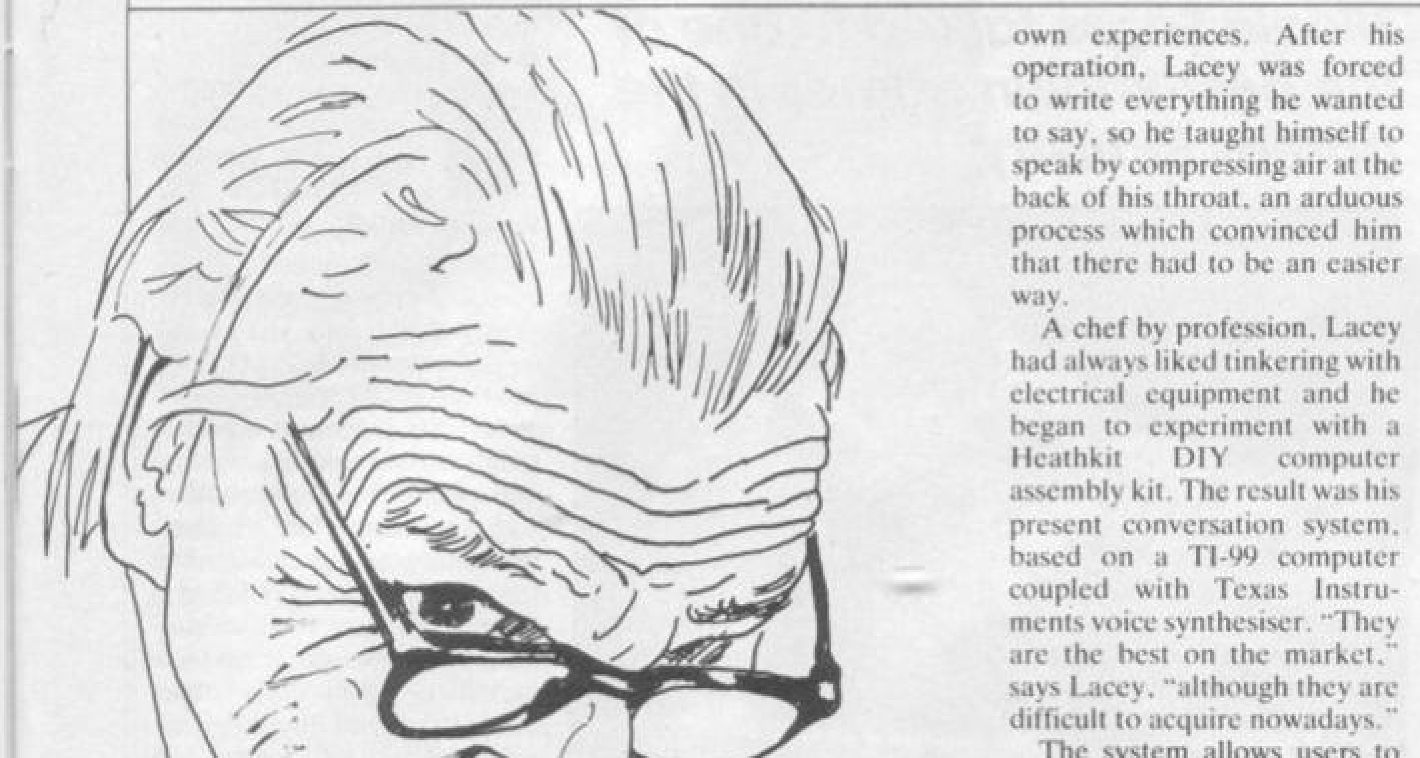
"Besides making everything neat and tidy and easy to check afterwards, the system saves a tremendous amount of time," says Spanton. "Sorting entrants into categories and drawing-up a fighting order normally can take several people several hours."

The system also offers tempting possibilities. At

national or international tournaments, there is no reason apart from a financial one why each area should not have its own terminal which would not only print-out elimination sheets but display on large screens the category, the round and the results of each contest as it takes place. At present, such matters tend to remain baffling not only to many spectators but sometimes even to the contestants.

"People have been talking about such a system for years but nobody had done anything about it," says Spanton. "It would certainly help to give karate wider recognition."

Spanton likes the fact that his TRS-80 has a twin disc drive incorporated, making it easy to take with him all over the country. "Now that I have stopped fiddling with the program, I spend only two or three hours a week updating the system," he says. "I don't know what the time saving is but I know it keeps me fully in touch."



CHARLES LACEY

In 1974, major surgery for cancer of the larynx left Charles Lacey unable to speak. Four years later, he was the winner of a £250 prize from the ITV programme Reports Action for "the most original and useful idea to help other people."

Lacey's plan was for a small specialist workshop producing communications aids for the disabled and the plan has taken shape at his home at Berinsfield, near Oxford. Amid an inpenetrable clutter of wires, TV sets, keyboards and other components, Lacey has devised a series of chip- or computer-based aids catering for a variety of special needs.

Several resulted from his own experiences. After his operation, Lacey was forced to write everything he wanted to say, so he taught himself to speak by compressing air at the back of his throat, an arduous process which convinced him that there had to be an easier way.

A chef by profession, Lacey had always liked tinkering with electrical equipment and he began to experiment with a Heathkit DIY computer assembly kit. The result was his present conversation system, based on a TI-99 computer coupled with Texas Instruments voice synthesiser. "They are the best on the market," says Lacey, "although they are difficult to acquire nowadays."

The system allows users to 'speak' and display on the screen pre-set phrases by keying-in numbers. Lacey's demonstration program says things like "Hello, how are you?" or "It is teatime," but the phrases can be altered by changing the print statements in the program. The same tape holds a variant in which some 600 words are arranged in an array, so that users can have the word 'spoken' and displayed by typing-in two code letters indicating the position of the word in the array.

Another program based on the same system is designed for children learning at home. The synthesiser speaks a word and the child spells it, being rewarded with a tune if correct and a raspberry if not. In a program to help the blind learn to use a keyboard, the synthesiser speaks each letter as it is typed and then pronounces the finished word or phrase.

So far, Lacey has assembled four complete units, consisting of computer, monitor, synthesiser and tape, and given them away. "I scrounge everything I need," he explains. "All the big companies are willing to help – STC, Hitachi, General Instruments and others."

New projects

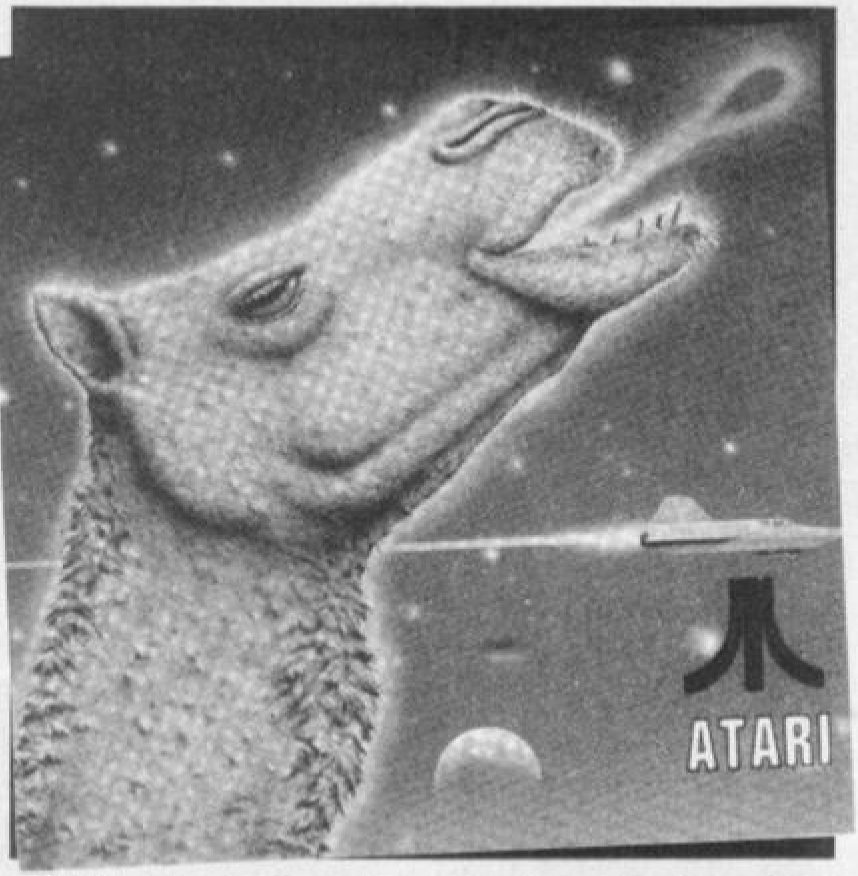
Lacey is now busy on two new projects which he hopes to have ready in time for an exhibition of his products at Sheffield Polytechnic in April. One is a speech recognition and synthesis unit to provide the deaf with a form of electronic mail. Consisting of three chips on a board, it will display a message transmitted by Citizen Band radio on to a TV screen. "It will be much cheaper than the telephone," says Lacey.

The other scheme aims to help the severely paralysed use a keyboard, in that case one of two Spectrum keyboards donated by Sinclair Research. Photodiodes beneath each key will permit the user the operate them by shining a light briefly – perhaps strapped to the forehead – on each key in turn.

Now aged nearly 70, Lacey busies himself all day and well into the night, not only with his communications aids but with mending TV sets for the old and disabled – selling the occasional set to cover his costs – running a handicapped children's teatime club, and printing the village newspaper. Nevertheless, he will always find time to demonstrate his inventions. Queries to Charles Lacey, 50A Colwell Road, Berinsfield, Oxon OX9 8NU. Tel: 0865 341305.

Camel train to fame

Few programmers manage to combine commercial success with independence but Jeff Minter has done just that. Nicole Segre talked to one of the best-known names in the games industry



Anyone who has played a computer game has probably heard of Jeff Minter, with his string of Commodore chart-toppers, his abiding love of llamas and his equally strong aversion to barbers. Those are not his only claims to fame. At a time when the software industry, young as it is, seems to be losing its bloom of innocence, Minter stands out as one of the few pioneering spirits to have withstood the forces of commercialism, while still managing to do well for himself.

A model of productivity, Minter has released some 15 games for the Commodore 64, eight for the Vic-20, three for the Atari, plus a number of conversions for a range of machines, including the Spectrum, BBC, Amstrad and MSX. Each new game usually has been deemed better than the one before it and snapped up by an appreciative public.

Beginnings

All that has allowed him to live in the style to which he aspires. A keen skier, he has just bought a small apartment in the French resort of La Plane. He drives a comfortable Ford Cabriolet – "not flash, but fast," he says – and has built an extension to his family home near Basingstoke. It houses "more computers than I could want," an even more impressive collection of toy camels, llamas, yaks and sheep, the heavy rock records which enliven his working hours, and the three second-hand arcade machines which allow him to relax with his favourite games – *Tempest* and *Stargame*.

Besides skiing holidays and business trips to the U.S., Minter has also enjoyed a first pilgrimage to Peru to visit the llama in its natural habitat.

The Minter success story dates from 1978, when at sixth form college at Basingstoke he first "messed around" with a Commodore Pet and taught himself machine code. More interested in his ZX-80 than in mathematics and physics at Norwich University, he was asked to leave and went to Oxford Polytechnic.

By then he had progressed to the high technology of a ZX-81 and was combining studying in the daytime with programming for dK'Tronics at night. The result was three months of ill-health which put an end to his academic career. There was nothing for it but to spend more time with his latest acquisition, a Vic-20.

Friends encouraged Minter to try to sell his first game for that machine, a straightforward copy – which he later called *Andes Attack* – of the arcade game *Defender*. Setting the style for all future Minter productions, he organised all the duplication and printing and included what was to become his trademark, little llamas in place of people.

The theme may appear to be a gimmick but the fascination is genuine. "As long ago as I can remember, I have been interested in camels," says Minter. "They have beautiful faces, like something from another planet. When you get to know them, llamas are even better."

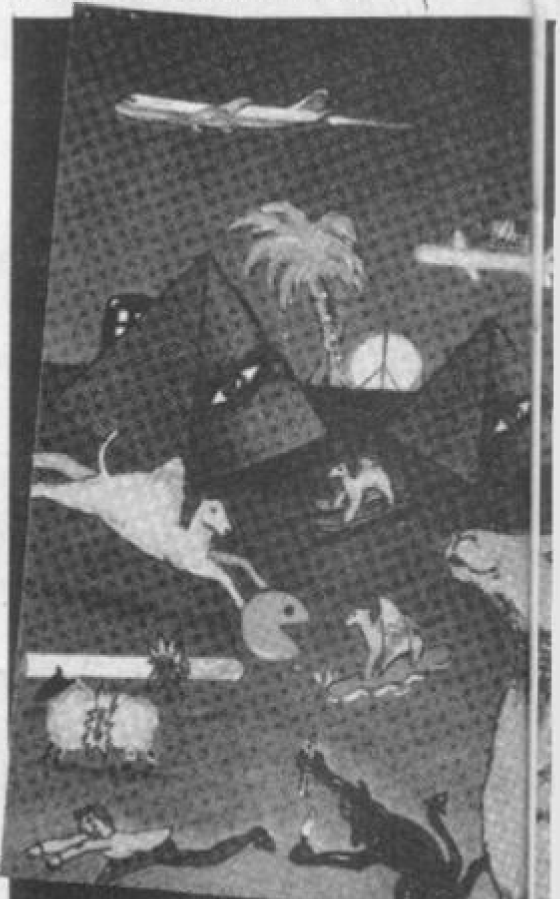
Released in time for the Commodore Show in 1982, *Andes Attack* sold far better than Minter expected. "One thing led to another," he says. Deciding that the earlier game was crude, he wrote *Tracks*, and then *Grid Runner*, "a version of *Centipede* but more vicious." It was a great success in the States and convinced Minter that it was time to start designing his own games rather than copying arcade favourites.

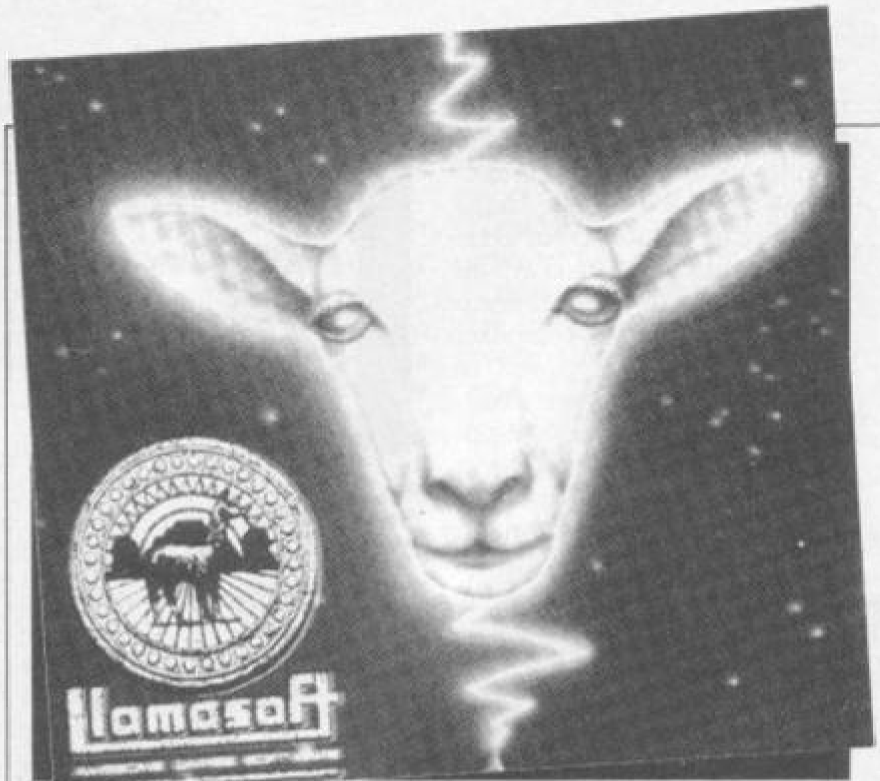
Attack of the Mutant Camels, started before *Grid Runner*, featured the distinctive Minter fauna but otherwise was based largely on *Star Wars*. Minter's first truly original game was *Hovver Bovver*, devised with his father after a stay in a farmhouse which impressed them by its immaculate lawns. For once, the action takes place on earth rather than in space, with the aim being to mow the grass in a race against unfriendly neighbours, dogs and other hazards. Later lawns, naturally enough, are in the shape of camels.

Revenge for all

Bovver took months, rather than weeks, to write, as did the game which really put Minter on the map. Released in 1983, *Revenge of the Mutant Camels* with its smooth-scrolling graphics, its re-designed, slimline camels and hectic action, was an instant hit. "I don't really program for children but for people like myself," says Minter. "Revenge of the Mutant Camels was where my taste coincided with the mass market."

Minter's following has remained staunchly loyal ever since, notwithstanding titles like *Sheep in Space*, *Metagalactic Llamas*, *Battle at the Edge of Time* and *Ancipital*. *Yak's Progress*, a compendium which offers the entire Minter production for the price of only one game, is set to create a new





following among those who did not buy the first time round.

Meanwhile, nothing has changed the way Minter operates. He has set up a company, Llamasoft, to market his wares, including conversions for which only the programming is contracted, but Minter still writes all the games, while his mother handles all administrative and business matters.

Apart from a musician friend who has helped create the tunes in games like *Hovver Bovver* and *Revenge,* and a Southampton-based artist, Steinar Lund, who designs all the posters and inlays, no-one else is involved.



"I don't trust anyone else," says Minter, who wages a relentless campaign against commercialism, and distributors in particular. "I don't like them, and they don't like me," he says. "They have destroyed the industry. There's no more room for creativity – it's all American imports and games which look the same. Distributors look only at companies which can afford to advertise, so good people go down and others releasing drivel are still there."

An experiment

Minter denies rumours that a deal with another software house, Ariolasoft, to market his latest game, *Batalyx,* is the first sign of a Llamasoft sellout. "It is an experiment," he says. "I want to see if they can do any better on the distribution front than we do. If the deal is a success, we might do others, but not with *Colourspace.*"

Colourspace is his latest production, a version of *Psychedelia,* which has already appeared on seven machines, for the new Atari 520ST. "I shall market that myself and it will be a great success," Minter says.

A break from previous form, Colourspace is a light synthesiser, controlled by a mouse to produce what Minter calls "an interactive firework display in time to music" – preferably his own brand of heavy rock. Minter claims that the new Atari program is years ahead of earlier versions on, say, the Commodore or BBC, with its higher resolution and the complete flexibility the mouse provides.

"It will blow everybody's brains," delares Minter, who plans to demonstrate it on wide screens at music and light shows in Sheffield and at Cardiff University. "Everybody thinks of software in terms of either games or utilities but there are other possibilities."

Eventually, Minter plans to produce a version of *Colourspace* for the Commodore Amiga but in the meantime there is to be another game for the Commodore 64. "While I am writing one game, new ideas are piling up," he says. "There's no danger of running out."

He believes that the Commodre 64 will keep going "for a time longer," as will the Spectrum merely on the strength of the software available for it. The future, he thinks, lies with the new 16-bit machines such as the Atari 520ST and the Amiga. "The Atari is fast, cheap and has amazing graphics, although the sound is not so good as on the Amiga."

The problem with the Amiga, however, is that Commodore is selling it for more than £1,000 and marketing it as a business machine. "Why do that when its sound and graphics make it brilliant for games?"

Plenty of scope

While bemoaning the good old days of enterprise and individuality, Minter has not lost faith in the software market. "There will always be room for games," he says. "There is still plenty of scope in the States, although Americans are a little inpredictable in their tastes. Europe could do with a more opening-up, too, especially Germany, even though it is riddled with piracy." The answer to piracy, he believes, is to make games so complex that no-one can copy them. "Take *Colourspace,*" he says, reverting to his favourite topic of conversation. "The manual alone will take three weeks to write. No-one could possibly copy it."



Minter is also confident about the future of Llamasoft. "The secret is not to flood the market," he says. "It's like Genesis – it doesn't release a record every week but when it does all the fans buy it."

Simple things best

There is another essential element in his popularity. "Games should not be an exercise in marketing," he says. "They are all about having fun and enjoying yourself. It is good to see plenty of complex adventure-type games but, in the end, you can't beat the raw excitement of blasting hell out of everything." To prove his point, Minter demonstrates his skill at the game which keeps him from his bed until the small hours, *Z from Rhinosoft.* "A simple concept but some of the best things are simple."

Minter's resistance to current trends appears to have done him nothing but good. "I have succeeded in spite of myself," he says cheerfully. A champion of individuality, able to please himself – "What other company could produce *Colourspace?*" he asks – while still achieving popular acclaim, he stands out as proof that perhaps, after all, where software is concerned small is beautiful.



Disc drives

Get to grips with disc drives – Lee Paddon explains the jargon and tips some best buys.

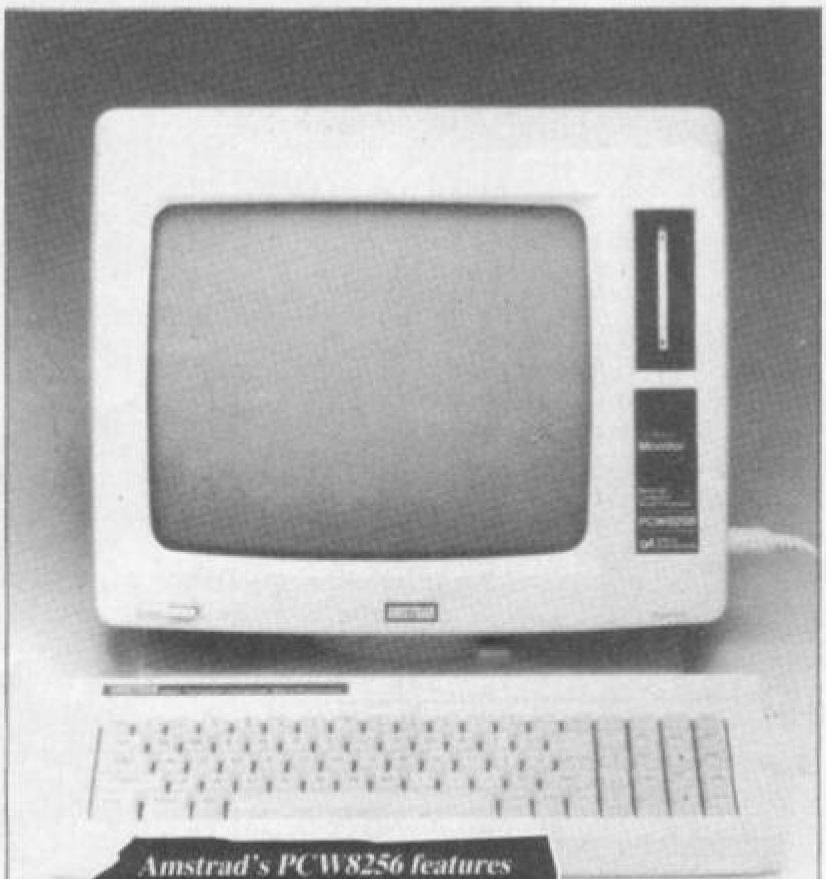
A year ago a disc drive for your micro might have been regarded as an expensive luxury, but now, with the price of drives falling all the time, they are within the price range many people looking to up-grade their computer systems. So what are the benefits and possible pitfalls of disc systems and how do you cope with the conflicting claims and jargon?

While the number of disc systems available is greater than ever, the choice of which to buy is, if anything easier than in the past. This is because a number of manufacturers, including Amstrad, Atari and Commodore, produce disc systems tailored to the requirements of their range of computers. The majority of users will be best advised to opt for such a disc drive as they will thus be assured that there will be no compatibility problems when they come to connect the drives to their computer. With equipment that is still under warranty, choosing drives from the same company that produced the computer is also the surest way of getting any hardware problems that may develop sorted out with the minimum of fuss and cost.

While the major manufacturers have entered the disc up-grade market, there are many specialist firms offering disc systems with a wide range of specifications. If there is no approved disc system for your computer, or if your requirements are unusual, one of these companies will often be able to supply a system to meet your needs and will also be able to offer technical advice in order that the drives you purchase will meet your specifications. Drives from such specialist organisations can also work out much cheaper than those bought from a computer manufacturer.

Anatomy of a disc

A disc is far more than a fast cassette recorder because, like an LP record, the user is able to reach any particular track on the disc directly. Contrast this to a computer tape filing system in which to reach a given file on the tape the computer must first read the file header on any preceding files, only loading data into memory when it detects a match between the header information read from the tape and the file specified in the load instruction. With any more than two or three files on a tape, it can take a considerable time to reach a specific file if it is not one of the first on the tape.



Amstrad's PCW8256 features a built-in 3in. disc drive.

The rate at which data is transferred from a disc to the computer's memory is also much faster than the 300 or 1200 bits per second speed that is the norm for cassette based systems. These facts combine to make it possible to treat a disc drive as an extension of the computer memory. So databases and spreadsheets are no longer limited to 30K or so of workspace within the computer. Even if you do not use such heavyweight programs on a regular basis, a disc drive is reliable and the discs less cumbersome to store than tapes, although some disc based software can be expensive. Much Commodore software, especially that imported from the States, is disc-based and rather costly. That, you might think, would limit the appeal of discs but this is certainly not the case in the U.S. where disc based software is the norm. An average transatlantic cousin would no more use a cassette player to load software into a computer than wear boxing gloves to drive a car. Cassette based software is a British innovation. That explains the bizarre nature of some American imports which seem to entail endless messing around with the tape deck, flipping the cassette and so on. They are just badly converted disc-based games.

Many recent adventure games such as *The Hitchhikers Guide* rely on the speed of discs in order to load in the large sections of text that the game must manipulate. It is not only when using commercial software though that the advantage of using discs is apparent. When developing your own software, it is possible to rapidly back-up each new version of a program and so easily recover from the inevitable craches that occur when testing new section of a program.

Bits and PCs

There are three components to any disc system. The drive, a mechanism which rotates the disc and moves the read write head across its surface. The disc interface or controller makes the computers disc expansion port electronically compatible with the drives. The third component of a disc system is the software that drives the interface – the Disc Operating System or DOS.

The vast majority of disc drives in use with low cost micros are known as floppy discs. This term is derived from the fact that 5¼in. discs are indeed, well, floppy. There is the story, now passed into the folklaw of the computing industry of the postman who had to get a package containing a 5¼in. disc through a 4½in. letter box. The lable of the package stated clearly 'Floppy Discs – Do Not Bend'. Before squeezing the discs through the letter box, the postman wrote the words 'Oh yes they do!' on the parcel. The more recent 3 and 3½in. discs are encased in a rigid plastic case and are more robust than 5¼in. types. They are still termed floppy discs though in order to distinguish them from the other type of disc – the hard disk.

Hard discs, by virtue of their high cost, have impinged little on the world of home computing until now. New low cost hard drives from the likes of Atari will mean that many more users will be able to afford to opt for a hard disc drive in future. The operation of hard discs is very different from floppy drives though and we shall leave discussion of them to a future article. The rest of this buyer's guide will concern itself with the various types of floppy disc drive.

Disc drives come in a variety

of types and sizes but most use what is termed a Shugart bus. The major exceptions are drives which have been designed for use with a specific micro. The drive mechanism will feature either one or two read/write heads, i.e. it will be capable of reading only one or both sides of the disc at once. In addition, drives will record either 40 or 80 tracks of information per side. Drives with a 80 track capability are able to store far more data per side than their 40 track counterparts. In order to avoid any compatibility problems (a 40 track drive will not be able to read software supplied on a 80 track disc) it is best to buy one of the increasing number of discs that are switchable between 40 and 80 track operation. The best type of drive to select will be a 40/80 switchable double sided model. These though will also be the most expensive choice, see below for a guide to the priorities to bear in mind when selecting a disc system.

Disc drives come in a variety of sizes. The first floppy discs to be developed were used to bootstrap the operating systems of large main frame computers. In keeping with the big is beautiful philosophy of mainframe machines these first discs were 8in. monsters. The most popular format is the 5¼in. disc which is a direct descendant of the first 8in. discs. More recently both 3 and 3½in. discs have been developed.

Each disc format has its pros and cons. The 5¼in. variety are both reliable and cheap. Against this they are bulkier than the newer 3 and 3½in. types. These 'mini' formats are more robust than 5¼in. types but both the discs and the drives are more expensive. A 3in. drive has an electrical specification that makes it identical to a 5¼in. drive and the two types of drive may be interchanged at will. 3½in. drives come in two types. One is compatible with 5¼in. drives while the other format, by virtue of different rates of data transfer is not compatible with 5¼in. systems.

While the 5¼in. format, as used by IBM in its PC computer, is likely to remain the dominant standard for a number of years, the two mini formats are gaining an increasing popularity. In the race to become the new standard format, the 3½in. drive seems to be winning the race. Atari have adopted the 3½in. format while the only volume manufacturer to adopt the 3in. format is Amstrad. It is also strongly rumoured that IBM will select the 3½ format for its new PC computer. Thus while 5¼in. drive will be around for some time, the next floppy standard is likely to be 3½in. with the 3in. format being a little used, in mass market terms, alternative.

While the number of disc systems available is greater than ever – choosing the right one for your computer is, if anything, easier.

A major consideration when selecting a disc system is whether or not to buy dual drives. Note that dual drives should not be confused with double sided drives. A dual drive system will consist of two, discrete drive units which may themselves be single or double sided. A double sided drive is a single disc drive that features two read/write heads in order that both sides of the disc may be used for data storage. Note that while both 3 and 3½in. discs are flippable, that is the disc may be removed and turned over in order to store data on both sides of the disc, 5¼in. discs cannot be inserted up-side down.

Some people may consider dual drives to be a luxury but many would consider them to be an essential requirement in any system. Having a dual drive allows the user to designate one drive as the system drive. This will hold the disc containing the applications software in use. The second drive would be designated the working drive and would hold any data files created by the system. Configuring a system in this way will reduce the amount of disc swaps while using many software packages adding greatly to the ease of use.

A final consideration when selecting the hardware of a disc system is whether or not the drives have an internal power supply. In general the amount over space capacity in a computer's internal power supply is limited and relying on it to supply external equipment is not recommended. It is therefore advisable to select a disc that features its own mains driven power supply.

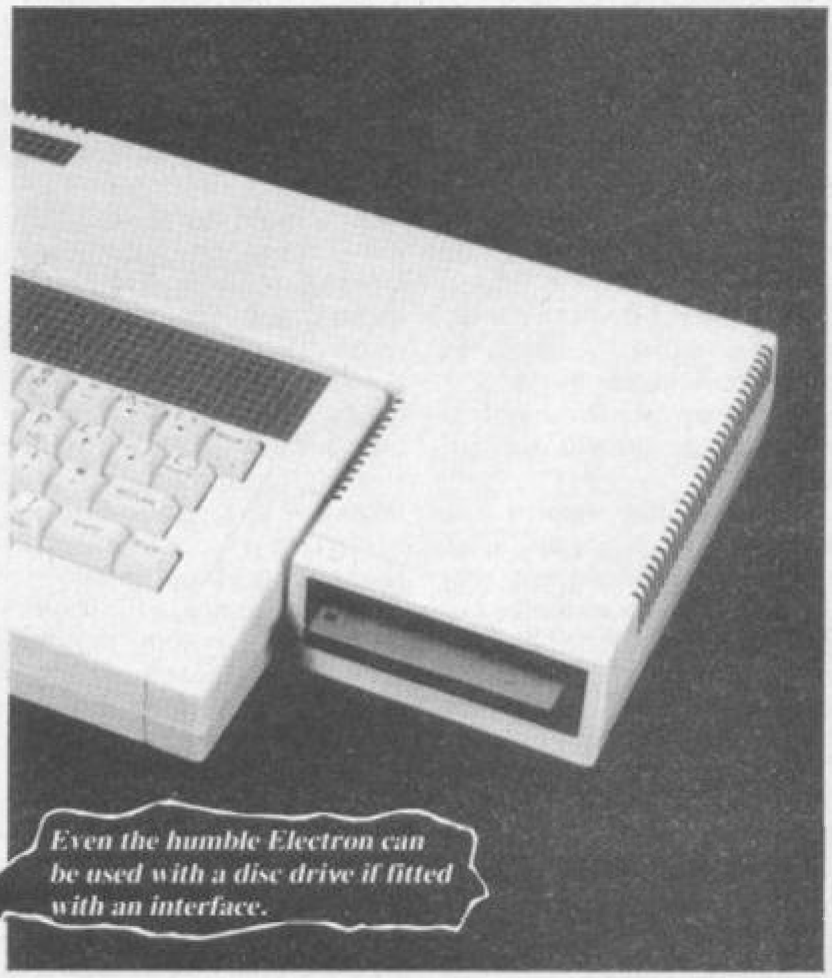
Dosing down

While the selection of the hardware that goes to make up a disc system is important, even the best hardware will be of little use without a good operating system to support its operation. It is in the specification of DOS software that the jargon jungle is at its most impenetrable and what you get is determined largely by how much you are prepared to pay.

Certain terms occur again and again. Single versus double density is probably the most important factor. Double-density operating systems are more expensive but offer twice as much storage capacity per disc – on a pence per bit basis they will inevitably be better value for money. If the amount of storage is a prome consideration, you should opt for a double density filing system and 80 track disc drives. One word of caution here. Make sure that the storage capacity quoted for a drive is the formatted capacity. Some manufacturers quote an unformatted figure which will alsways be far more than the storage space available when the disc has been formatted for use.

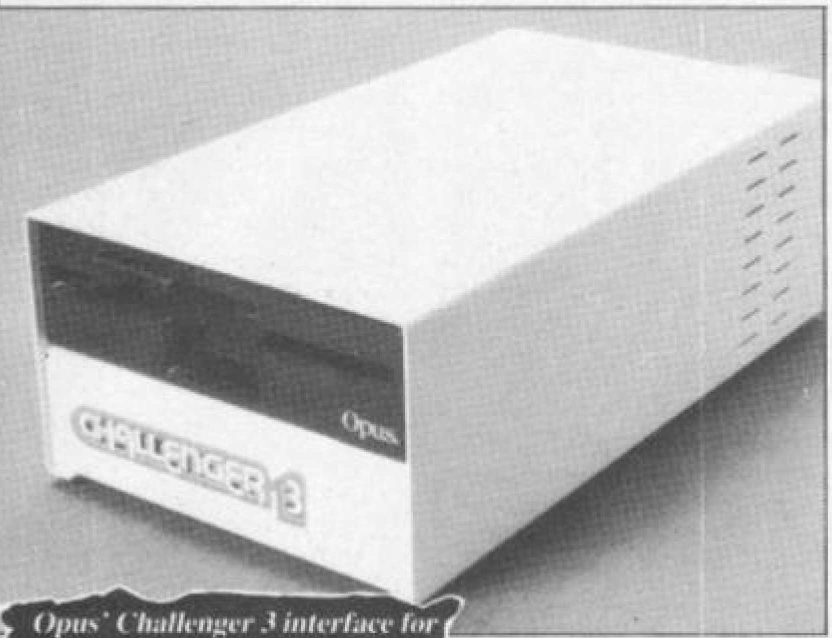
Another important facility to look for in a DOS is an ability to handle random access files. Many budget operating systems do not support random access files. This means that in order to change a specific item of data within a set of records the complete file must be read into memory, altered and the ammended record read back to disc. This is a poor second best to a true random access disk filing system.

Speed is another considera-



Even the humble Electron can be used with a disc drive if fitted with an interface.

Disc drives



Opus' Challenger 3 interface for for the BBC micro.

tion when selecting a disc system. The overall performance is a function of both the drive mechanics and the operating system in use. If you are to use a disc system to handle large volumes of data, it will pay you to select a system that offers the fastest possible access times.

Another important question to ask about a particular DOS is how much RAM the system requires. Users of both the BBC and Spectrum computers have found to their cost that a memory hungry DOS means that they are unable to run some programs that require to full complement of computer RAM in which to operate. Another consideration is where within the computer's memory map the DOS is located. If the DOS is loaded into an area of RAM that is set aside for use with other peripherals, it may not be possible to use the disc system when certain other devices are in use.

Some DOSs support the operation of a RAM disc. This very useful facility means that the DOS sets apart an area of the computer's RAM for the storage of program data. To the user the RAM disc behaves as a very fast ordinary drive.

Perhaps one of the most important considerations when selecting a DOS is the range of commands it supports and the syntax of these commands. One of the worst examples of command syntax is that adopted by Sinclair microdrive system. That is mainly because you have to specify a large number of parameters in a very inflexible format. A good DOS will assume sensible, default, values if the user fails to specify them. The Commodore 64 disc system is also an example of a disc system with a cumbersome syntax. For example to list the files on a disk the directory must first be loaded with the LOAD "$",8. This must then be listed with the LIST command. In most DOS software, to list the directory a simple DIR will suffice.

A useful facility of a DOS is the ability to implicitly name files by means of wildcards. A file name usually consists of two parts, a name and an extension. Wildcards allow a disc command to apply to all files with a particular extension or all files which start with a particular string. For example in Amstrad CP/M entering PIP followed by the command m:=a:*.BAS will transfer all files with the BAS extension from drive a to drive m.

All disc systems support a form of the CAT or DIR command that allows users to list all the files stored on a disc. A good DOS should also be capable of providing additional information on the files, for example file size, type and execution address.

One final point to watch for in a disc system is the way it handles errors, both those generated by the system and those that result from misuse by the operator. For example if the user tries to save a file with the same name as one that already exists on the disc, in an ideal world the DOS would inform you politely that this was the case and ask you to confirm that you wished to over-write the exiting file. There are however two extreme reactions. Either the DOS will generate an error message and refuse to execute the command or it will erase the old file without any warning. Perhaps the best way of dealing with this circumstance is the system adopted by CP/M. This leaves the old file on disc but changes its file extension to .BAK. The old file can, if required, be retrieved by renaming the old file with the RENAME command.

Naming names

In the 5¼in. disc market, no matter what the label on the case, you are in all probability looking at one of three types of mechanism. The cheapest is the Mitsumi drive.

Next in refinement are the Shugart drives. These drives are invariably direct drive and are very reliable.

The best disc drives are from Mitsubishi and Teak. No matter what the casing, they are easy to spot. They contain a solenoid which picks the head from the disc surface when not reading or writing information to the disc. The characteristic clunks and clicks that accompany operation of the drive are unmistakable. The system usually prevents corruption and timing problems are rare.

BEST BUYS

The choice of disc drive to buy will depend on how much money is available. If funds are limited, the choice will be restricted to a single drive. If possible though try to get at least a 40/80 track drive, double sided if possible. We would strongly recommend that you try to save up for a double drive as this type is far easier to use in the majority of applications.

When it comes to the choice of operating system, perhaps the most bewildering choice confronts the BBC owner. The original DOS from Acorn had many failings but the new version settles virtually all the major moans about the original. It may not be the best and is certainly not the cheapest – it is though official. That means that any commercial software is likely to be available in this format and all future developments will be based around it.

There are however many other disc systems produced for the BBC micro. The majority of these achieve a high degree of compatibility with the official Acorn DOS. Many of these alternative systems offer additional facilities and in the main are cheaper than the Acorn product.

Commodore owners have little choice but to stick to the official 1514 drive. Despite its poor performance in terms of speed and its strange syntax, to ensure compatibility with commercial software, this drive is the only sensible choice. A word of caution here though. If you buy a 1541 you should buy the more recent version of the drives – there are still some pre-historic versions of the drives around. They are recognisable for being lighter in colour – the current battleship grey of the computer and they do not have the multi-coloured stripes on the front.

Spectrum owners are not likely to find much commercial disc based software available for their machine. Any system will be used either to develop their own software, or possibly to back-up unprotected commercial software supplied on tape or microdrive. Few Spectrum owners will be able to justify the high cost of adding disc drives to their machine though and many will be content to put up with the erratic performance of microdrives.

Compumart

NEW!!! LOW COST SHORT TERM FINANCE NOW AVAILABLE

Mega Deals

See us at the ATARI COMPUTER SHOW — 7-9 March, Novotel, London

Best Price for ATARI HARDWARE in the U.K.

ATARI

Atari 130XE Computer	£119.95 + £3 p&p
Atari 1050 Disk Drive (with FREE Home File Manager, Payoff Adventure, Demo Disks & 10 FREE Blank Disks)	£129.95 + £3 p&p
Atari 1027 Letter Quality Printer (with FREE Atari Writer)	£145.00 + £3 p&p
Atari 130XE, 1050 Disk Drive & 1027 Letter Quality Printer (with FREE Home File Manager, Payoff Adventure, Demo Disks, Atari Writer & 10 Blank Disks)	£350.00 + £5 p&p

Goods despatched : SAME DAY — PARCEL POST

12 Month Warranty : ANY PRODUCT FOUND TO BE DEFECTIVE WITHIN 12 MONTHS OF PURCHASE WILL BE REPLACED — FREE OF CHARGE

CONTACT US NOW FOR THE LATEST PRICES + AVAILABILITY OF ALL ATARI PRODUCTS

Best Prices for BLANK DISKS in the U.K.

Top Quality 5¼" Bulk Packed Disks
(Hub-Ringed and in White Envelopes with a Lifetime Warranty)

FREE!!! Plastic Library Case worth £2 when you buy 10 Disks

FREE!!! Perspex Disk Storage Box worth £10 when you buy 50 Disks

10—5¼" Single Sided/Double Density Blank Disks (with FREE case)	£9.95 + £1 p&p
10—5¼" Double Sided/Double Density Blank Disks (with FREE case)	£13.95 + £1 p&p
50—5¼" Single Sided/Double Density Blank Disks (with FREE Storage Box)	£49.95 + £2 p&p
50—5¼" Double Sided/Double Density Blank Disks (with FREE Storage Box)	£69.95 + £2 p&p

GOODS DESPATCHED : Same day 1st Class Post
MONEY BACK GUARANTEE : If you are not completely satisfied with your purchase we will either exchange your disks or give a FULL REFUND — that's the Compumart Guarantee.

Compumart HOTLINE 0509-262259

Please send cheques/postal orders to :
Compumart, (Dept)
71 Gracedieu Road, Loughborough
Leics. LE11 0QF

NEW FUTURE SOFTWARE
!!YOU WON'T BELEIVE THESE PRICES!!
PLEASE NOTE OUR NEW ADDRESS

SPECTRUM

	RSP	OUR PRICE
GREAT SPACE RACE	14.95	3.25
TRAVEL WITH TRASHMAN	7.95	2.99
BACKPACKERS GUIDE	7.99	2.50
GREMLINS	7.95	3.25
ROCKY HORROR SHOW	7.95	3.75
HUNCHBACK II	7.95	2.95
MACHINE CODE II	7.95	2.50
CODENAME MATT II	7.95	3.25
VIEW TO A KILL	9.95	3.95
NICK FALDOS GOLF	9.95	3.75
LORDS OF MIDNIGHT	9.95	3.50
SYTRON	9.95	3.50
SPACE SHUTTLE	7.95	3.25
GYRON	9.95	3.95
SUBTERRANEUM STRIKE	6.95	1.99
ASSEMBLAGE 4 Game Compilation	8.95	3.50

BBC

	RSP	OUR PRICE
SPIDERMAN/HULK Twinpack	19.90	3.50
LINKWORD Italian	14.95	2.99
LINKWORD Spanish	14.95	2.99
MUSIC SYNTHESIZER	7.95	2.99
GRAPHICS PACK	7.95	2.99
VIEWFILE	14.95	2.99
VIEWCALC	14.95	2.99
PYRAMID OF DOOM	8.95	2.50

ELECTRON

	RSP	OUR PRICE
BANDIT AT 3 O'CLOCK	7.95	2.95
JET POWER JACK	7.95	2.95
GHOULS	7.95	2.95
SHUFFLE	2.99	1.99
SPACE SHUTTLE	9.95	3.25
STARDRIFTER	3.99	3.25
KILLER GORILLA	7.[illegible]	2.99
GREMLINS	8.[illegible]	3.95
CHUCKIE EGG	6.95	2.99
ARABIAN KNIGHTS	6.00	2.50
737 FLIGHT SIMULATOR	9.95	4.25

ATARI 400/800

	RSP	OUR PRICE
ARENA 3000	6.95	2.99
CUTHBERT/WALKABOUT	6.95	2.99
DANGER RANGER	6.95	2.99
MR DIG	6.95	2.99
PENGON	6.95	2.99
SPACE SHUTTLE	8.95	3.50
ELECTRIC STARFISH	7.95	2.50

COMMODORE 64

	RSP	OUR PRICE
AZTEC CHALLENGE (Disk)	14.95	3.95
FORBIDDEN FOREST	14.95	3.95
CODENAME MAT II	7.95	3.25
MAMA LLAMA	8.95	2.99

COMMODORE 64

	RSP	OUR PRICE
PSYCHODELIA	8.45	2.99
WATERSKI 3D	7.95	2.99
LOCO	7.95	2.50
GUARDIAN	7.95	1.99
3DS SCRAMBLE (like Zaxxon)	7.95	3.99
POSTER PASTER	7.99	2.99
GYROPOD	7.99	2.99
POSTER PASTER (D)	9.95	2.99
PIPELINE (D)	7.99	2.99
VIEW TO A KILL	10.95	3.95
GREMLINS	8.95	3.95
BREAKDANCE	7.00	2.99
CHINA MINER	7.00	2.99
SPRITE MAN (Pac Man)	7.00	2.99

COMMODORE C16

	RSP	OUR PRICE
ARENA 3000	6.95	2.99
CUTHBERT IN SPACE	7.95	2.99
CASTLE DRACULA	6.95	2.99
CUTHBERT IN COOLER	6.95	2.99
WILLIAMSBERG ADV/3	5.95	2.50
ULTIMATE ADV. 4	5.95	2.50
FOURPACK – Hop It, Shoot It Munch It and Climb It	14.95	7.95
FOURPACK II – Water Gr'd Prix, Auto-bahn, Vox & Apollo Rescue	14.95	9.95
GREMLINS	8.95	3.95

VIC 20

	RSP	OUR PRICE
DESTROYER	7.95	1.99
FROG RUN	5.95	1.99
SPACE BOMBER/Man on Run	6.95	2.50
COSMIADS	6.95	1.99
ASTEROIDS	5.95	1.99
JUMPIN JACK	7.95	2.95
SNACKMAN	6.95	2.25
CHOPPER	7.95	1.99
PENNY SLOT	6.00	2.50
FALCON FIGHTER	6.00	2.50

AMSTRAD

	RSP	OUR PRICE
VIEW TO A KILL	9.95	3.95
LINKWORD GERMAN	14.99	3.99
LINKWORD FRENCH	14.99	3.99
BOUNTY BOB STRIKES BACK	9.95	4.75
WARGAME	9.95	6.95
GREMLINS	8.95	3.95
CODE NAME MAT II	8.95	3.25
CHUCKIE EGG	7.95	2.99
CHOPPER SQUAD	6.00	2.50
JEWELS OF BABYLON	6.00	2.50
ARABIAN KNIGHTS	6.00	2.50
MESSAGE FROM ANDROMEDA	6.00	2.50

Late addition to Spectrum & CBM64 EXCEPTIONAL STRATEGY/BOARD GAMES

TRADING GAMES SP/CBM	6.95
WARGAMES SP	6.95

ACCESSORIES

PROTEC SWITCHABLE INTERFACE	9.95
KONIX SPEEDING JOYSTICK	10.95
JOYSTICK INTERFACE FOR ELECTRON	12.95
BBC JOYSTICK INTERFACE	3.50

10% discount for orders £30 or over. This is just a small selection of games on offer. Send now for our seven page catalogue. S.A.E. please.

ALL PRICES INC VAT & P&P. CHEQUES POSTAL ORDERS TO:
NEW FUTURE SOFTWARE and send to: 4 Rowanburn, Canonbie, Dumfries, Scotland.
AUTOMATIC FREE MEMBERSHIP TO NEW FUTURE SOFTWARE CLUB WITH FIRST ORDER OR CATALOGUE REQUEST ... INCLUDES MONTHLY NEWSHEET WITH LOTS OF SPECIAL OFFERS & DISCOUNTS SOFTWARE PLEASE STATE 2ND CHOICE TO AVOID DISAPPOINTMENT
TELEPHONE ORDERS ON (05415) 539

PD630C

GREATEST SALE EVER. HUGE DISCOUNTS

COMMODORE 64

U.S. GOLD TITLES

UP & DOWN	£3.95
DOUGHBOY	£3.95
DIG DUG	£3.95
PAC MAN	£3.95
GROGS REVENGE	£3.95
TALLEDEGA	£3.95
BOUNTY BOB	£3.95
SPYS DEMISE/SPY STRIKES BACK	£3.95
WHIRLINURD	£3.95
BEACH HEAD	£4.25
STELLAR 7	£4.95
COMBAT LEADER	£4.95

OTHER 64 SOFTWARE

VIEW TO A KILL	£3.95
CODE NAME MATT II	£3.50
PSYTRON	£2.95
GREMLINS	£3.95

COMM 64 PACKS

COLLINS SOFTWARE YOUNG LEARNERS Inc. Paddingtons Early Visit; Paddington & The Disappearing Ink; Paddingtons Garden Game;	£6.95
COLLINS SOFTWARE PACK Inc. What's the Time; Know your Tables; First Numbers	£6.95
BRAIN TEASER PACK (worth over £30) Inc. Riddle of the Sphinx; First Moves; Snaffle; Word Wizard	£6.95
LONGMANS SOFT EDUCATIONAL PACK 6-10 yrs Inc. 3D Hypermaths; BMX Number Jump; Word Wobbler	£5.95

AMSTRAD DISCOUNTS Inc.

CLASSIC ADVENTURE	£2.95
ASTRO ATTACK	£7.95
MANIAC MINER	£3.95
SUPER PIPELINE	£2.95
ALIEN BREAK IN	£2.95
PUNCHY	£2.95
HUNTER KILLER	£2.95
SNOOKER	£2.95
CHUCKIE EGG	£3.95
MASTER CHESS	£2.95
ROLAND GOES DIGGING	£2.95
STAR COMMANDO	£2.95
HUNCHBACK	£3.95
CRAZY GOLF	£2.95
BLAGGER	£2.95
JET BOOT JACK	£2.95
CHOPPER SQUAD	£2.95
SPACE HAWKS	£2.95
AMERICAN FOOTBALL	£4.95
CODENAME MAT II	£3.50
HARRIER ATTACK	£3.50
VIEW TO A KILL	£3.95
FOREST AT WORLD'S END	£3.50
HEROES OF KARN	£3.50
JEWELS OF BABYLON	£3.50
GREMLIN	£3.95
BOUNTY BOB	£4.95
RAID!!	£4.95
BEACH HEAD	£4.95

SPECTRUM DISCOUNTS

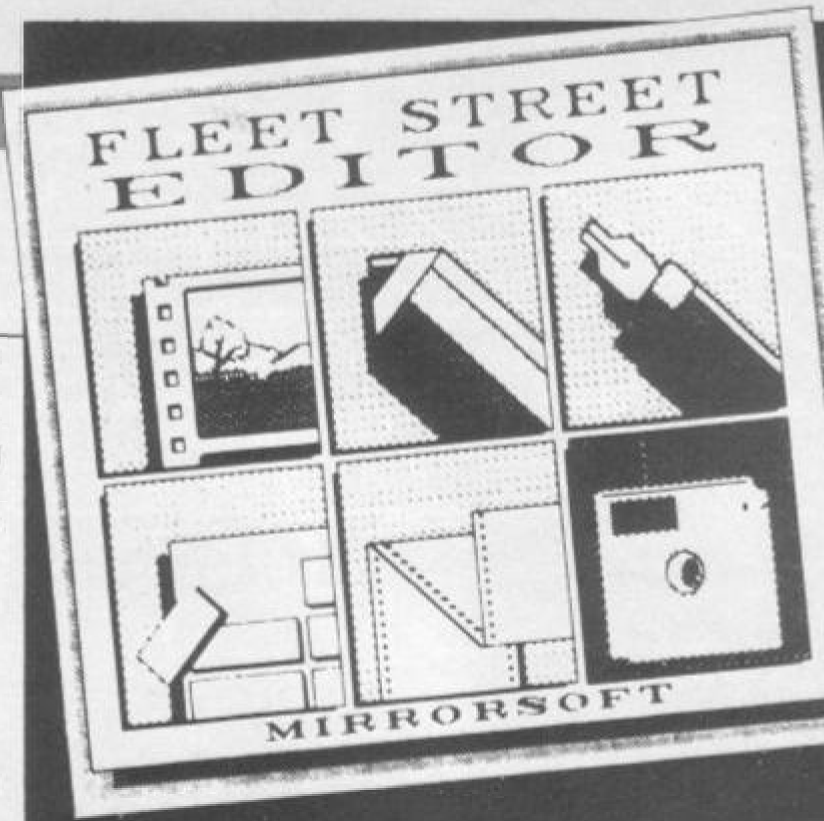
CODENAME MATT II	£3.50
VIEW TO A KILL	£3.50
PSYTRON	£2.95
GT SPACE RACE	£2.45
JONAH BARRINGTONS SQUASH	£4.95
GREMLINS	£3.95
CYCLONE	£2.95
T.L.L.	£2.95
ABERSOFT FORTH	£4.95
CONFUZION	£2.50
BACKPACKERS GUIDE	£2.95
DEATH STAR INTERCEPTOR	£4.45
RUNES OF ZENDOR	£2.95
SON OF BLAGGER	£2.95
EUREKA	£3.25
VALHALLA	£3.25

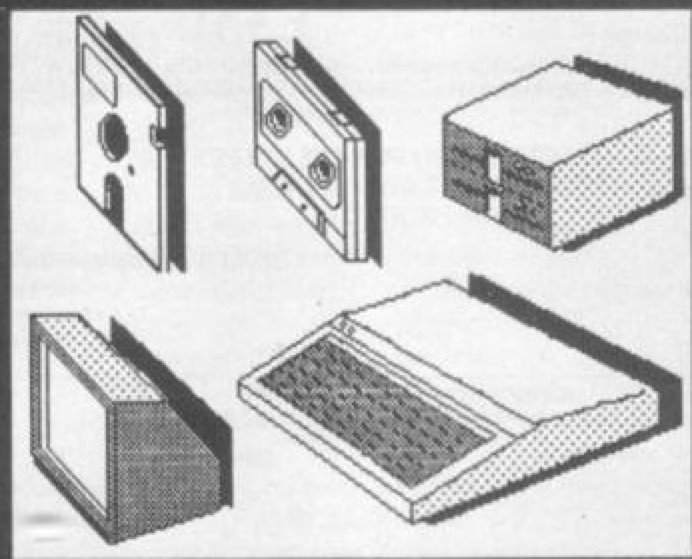
SPECTRUM PACKS inc.

HILL McGIBBON EDUCATIONAL PACK Inc. Car Journey; Ballooning; Puctuation Pete; Special Agent	£6.95
COLLINS SOFTWARE YOUNG LEARNERS Inc. Paddingtons Early Visit; Paddington and The Disappraring Ink; Paddingtons Garden Game	£6.95
COLLINS SOFTWARE PACK Inc. What's the Time; Know your Tables; First Numbers	£6.95
BRAIN TEASER PACK (worth over £30) Riddle of the Sphinx, First Moves; Snaffle, Word Wizard	£6.95
LONGMANS YOUNG LEARNERS 6-10 yrs Sum Scruncher; Robot Runner; Wild Words; ABC Lift Off	£6.95
LONGMANS SOFTWARE PACK Inc. Count About; Lunar Letters; Hot Dog Spotter	£5.95
SPORTS PACK (6 titles) World Cup Football; Snooker, On the Oche (Darts) St. Andrews Golf; Derby Day; Olympics	£5.95
WAR GAME PACK (4 titles) Dreadnoughts, Panzer Attack; Red Barron, Paras	£5.95
IMAGINE (6 titles) Zoom; Jumping Jack; Zip Zap; Stonker's Alchemist; Pedro	£6.95

LOGIC SALES LTD. 6 MIDGATE, PETERBOROUGH, CAMBS. PE1 1TN Tel: (0733) 313780
24 Hour Ordering Service — Access & Visa Welcome
All orders should state The Goods, The Machine & The Price Quoted.

Graphics





BBC micro owners have the chance to beat the majority of the Fleet Street barons in the race to produce publications using page make-up technology. Gary Evans gets into print with Mirrorsoft's hi-tech software.

Mention the words direct input or page make-up terminal to someone working in the publishing industry and you are certain to get a reaction. Some will approve of the technology which is set to revolutionise the industry while others will be equally strong in their condemnation of anything which looks likely to rock the boat of the *status quo*.

The Mirrorsoft *Fleet Street Editor* program and the BBC micro for which it is written is a scaled-down version of the systems which inevitably will find their way into the offices of magazines and newspapers throughout the world in the next few years. Describing Fleet Street Editor as a scaled-down version of professional systems is in no way to be taken as a derogatory comment. The software is capable of providing printed pages of text and graphics which will put to shame the efforts of many club magazine editors. As if to emphasise the effect computers will have on the publishing industry, significant sections of the Fleet Street Editor manual are devoted to a description of the processes by which the printed word can be duplicated and distributed. The message is that there is money to be made from the Fleet Street Editor if users are prepared to sell their personal publishing services to the public at large.

Starting out

Before getting down to a detailed description of the software, the manual takes the tyro publisher through a glossary of terms from the computer and publishing industries. Without a knowledge of the meaning of the jargon terms, it may be difficult to follow the sections. Study those pages well and you will know your WYSIWYG from your Litho and your cursor from your art work.

Fleet Street Editor is supplied as either a 40- or 80-track disc. We chose the 80-track version. The software was used with a standard BBC model B computer and we used it with both an Acorn and a Watford Electronics DFS. The disc drive used was a double-sided 5¼in. unit as supplied by Akter. The printer used for the majority of the review was a Taxan Kaga KP810. We also used a monitor from Amdek; use of a monitor is advisable as the software makes good use of the BBC high-res graphics capability and a TV set is not likely to do justice to the graphics output by the system.

The software is supplied on two discs, a system disc and another containing a comprehensive collection of picture and font files. The software is booted using the time-honoured BBC tradition of Shift-Break and, after a few moments, the screen displays a series of icons which represent the various departments into which the program is divided.

Dept. of Admin.

Those departments are designed to reflect the various stages in the production of a publication. When first using the package the department to aim for is administration. In a real newspaper that department would probably be full of accountants, but Fleet Street Editor uses the department to bring together all the functions which do not fall neatly under one of the other headings.

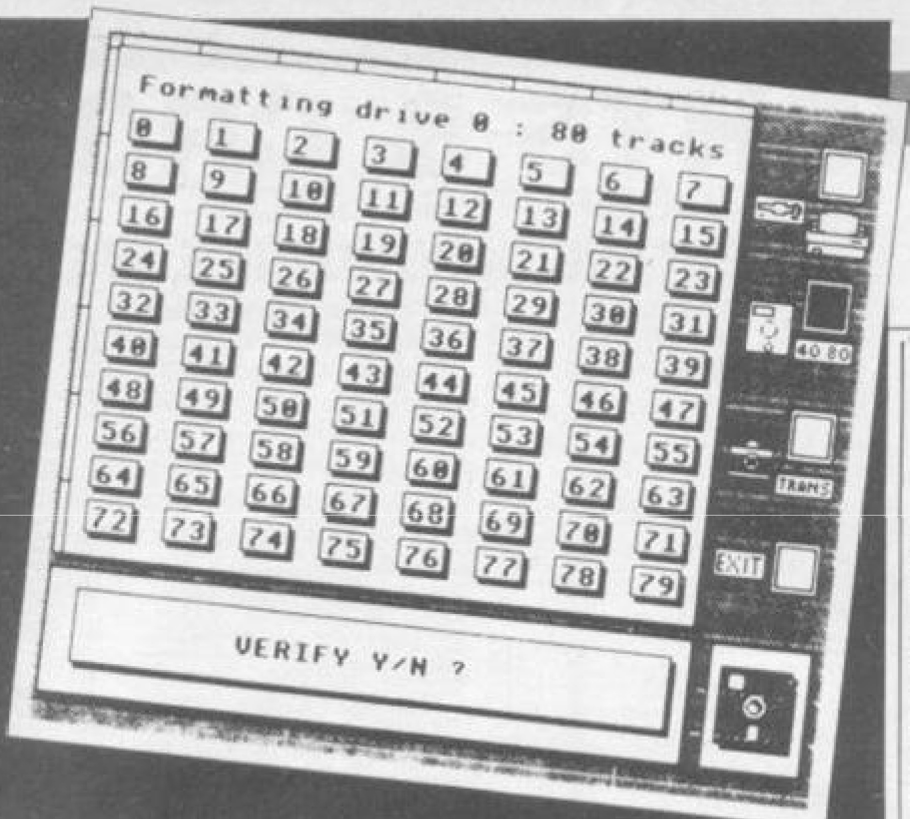
Selection of the icon is by way of the space bar, various icons being highlighted in turn until the Admin. icon is highlighted. The option selection is confirmed by pressing the enter key; at that point the screen clears, soon to be replaced by a central work area, a message window along the lower edge of the screen and a series of icons – by now you will have gathered that it is an icon-driven package – which run along the right-hand edge of the screen.

The manual then takes the user through a series of tasks, such as printer driver selection and the formatting of work discs. The formatter is claimed to be faster than many others on the market. We did no tests which could have supported that claim but can say that the program formatter offered the last word in graphics displays while it was going about its business. Each track as it was formatted caused a snappy drop-shadow box – see the Fleet Street Editor Glossary if you are not sure of your drop-shadow terminology – to appear. The verify process similarly plucked those boxes from the screen. The display alone means that next time we have a box of discs to format, we shall boot-up this formatter.

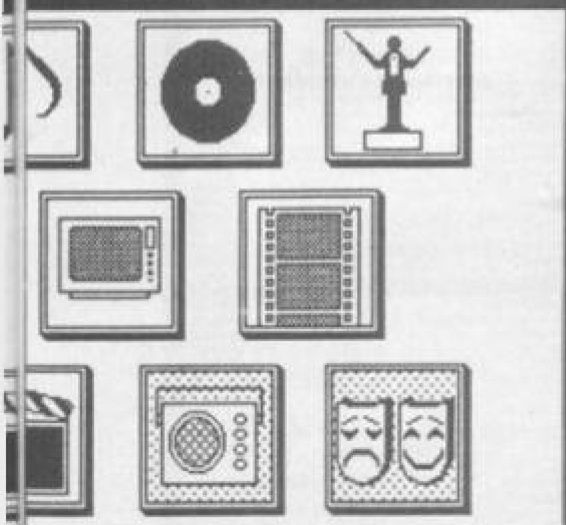
The Library disc provides a program designed to take the new user on a guided tour of the facilities available. For an idea of the versatility of Fleet Street Editor, there is no better way than to follow the stages on this tour.

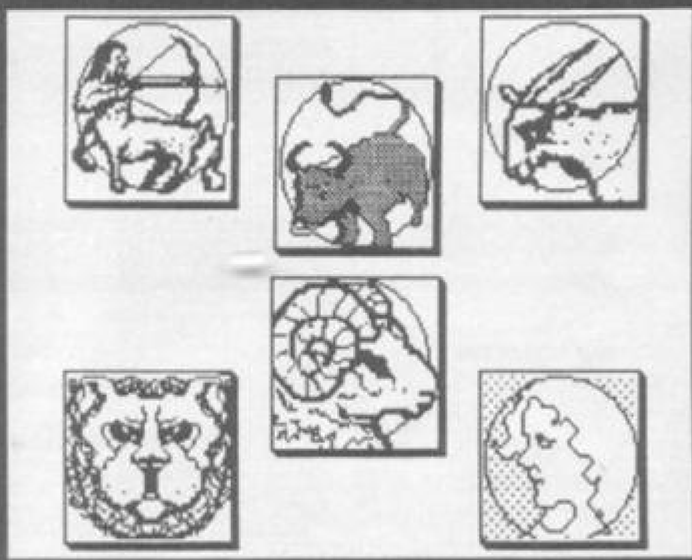
Stage one concerns the graphics library which is called into action by selecting the icon at the top left-hand corner of the main menu display. The next stage is to select a particular graphic from those available in the library – an appendix to the manual provides a helpful reference to the many shapes





…ve left – the main Fleet Street …tor icon display showing the six …artments that go to make up a final …e.
…ve Centre – examples of the type …es produced by the package.
…ve right – the disc formatter's on …en message page.





…amples of the extensive graphics library

provided with the package.

Having zeroed-in on the shape required, it can be selected and then positioned at any point on the page by selecting the studio option from the main menu. When satisfied with the appearance of the graphic it may be saved to disc by selection of the appropriate icon.

Words & pix

Next, the budding editor should move to the copy desk, the department which puts words round the pictures in our newspapers. You will have noticed that some newspapers have more words than others; many people think that a good thing. Let us hope that most users of Fleet Street Editor have a busy copy desk.

The first thing to do at the copy desk is to load the picture created in the studio. That is done by pressing f0 in conjunction with the shift key – many of the operations of the Editor are controlled by the function keys in combination with either shift or break and the package contains a function key strip as an *aide memoire*. Having placed the picture, words can then be entered either as direct input from the keyboard or from text files prepared under either Wordwise or View. Text may be entered in a variety of fonts and sizes to give the finished product the appearance of a traditional newspaper.

Mix 'n match

Fleet Street Editor was programmed by Clare Micro Supplies and its experience with the Fontwise software for both View and Wordwise has been put to good use. One piece of advice – do not try to mix and match too many typefaces. In general, the fewer the better, as a reader's eye is easily confused by being affronted with 101 styles and sizes of type.

Having put words and pictures together, it is time to make up the final page of the publication. That takes place in the page make-up department, which offers two types of page style. The first is a simple grid – four elongated boxes, more suited to posters than magazines. The second offers a more flexible layout of eight panels organised as four rows each of two boxes.

The guided tour files provide a number of text panels which are loaded into the various boxes in addition to your creation. The first panel loaded is a headline – headlines are inevitably big and the Editor allows the two boxes in the first row to be merged to form one big box large enough to accommodate the headline. The other boxes are loaded into the remaining six panels.

The final stage is to move to the preview and print department. The preview option allows the user to see a rough image of the final page. Because of the amount of information contained in a page, the resolution of the display of the BBC is not capable of displaying any detail. Selecting the print option will dump the final page to a suitable printer. The manual warns that that can take some time but there is nothing like seeing your first printed page coming off the presses.

Making money

Having got your pages from the printer it is time to take a step up in the world of printing and visit the instant print shop to copy and publish your masterpiece. The first pages you produce will probably not be up to the standard of a professional magazine and Fleet Street Editor will repay further study of its manual and experimentation with its wide range of facilities by allowing you to put together pages which begin to look just as good as professional ones.

National newspapers and magazines are put together by large teams of people using equipment costing thousands of pounds. It is not likely that Fleet Street Editor will allow you to better the publications produced by Mirrorsoft boss Robert Maxwell but it is possible to create some attractive page layouts. There must be many clubs, schools and organisations throughout the country needing to produce small newsletters and magazines.

The general standard of them is very low and the imaginative use of Fleet Street Editor could certainly improve many such publications. It sounds trite but this is a software package about which the phrase "its use is limited only by your imagination" really applies.

If you have the proper combination of imagination and a little business sense, the package certainly offers a way of making money with your computer. It certainly makes the most of the BBC micro.

WINTER GAMES

► *Spectrum ● U.S. Gold ● Sports Simulation ● Lee Paddon ● £9.95*

Sports simulations are possibly the greatest shot in the arm for the joystick industry yet developed. A dedicated Dally Thompson fan could leave an entire heap of mangled plastice behind him in his quest for gold.

Winter Games, though, ushers in a new era in the genre. Rythmic movement and a cool head have replaced frantic stick waggling.

Seven events are on offer, a fair cross section of the sort of thing Winter Olympians are called upon to undertake. Success in most of these requires timing rather than the application of brute force. The graphics are workmanlike with rather anorexic figure skaters.

One to four can play, each player takes a country from the large choice presented including such unlikely candidates for the Winter Olympics as Mexico and Australia. This all makes for a good evening's entertainment as you try to shave enths of a second off the records. After completing all the events, a ranking table is displayed and your eye moistens as the stiring chords of your national anthem resound around the stadium.

It's good to have a sports game which doesn't need you to go into intensive training to play. Coming from a country justly proud of its heroic place in Winter Sports, personified by Conrad Bartelski, the greatest living exponent of the downhill, we hope that the game manages more than Conrad's usual token appearance in the charts before ignobly crashing in an undignified heap.

GRAPHICS ●●●●
SOUND ●●●
PLAYABILITY ●●●
VALUE FOR MONEY ●●●●●
OVERALL ●●●●



IRIDIUM

► *CBM 64 ● Hewson Consultants ● Shoot-em-up ● Lee Paddon ● £0.00*

GRAPHICS ●●●●●
SOUND ●●●●●
PLAYABILITY ●●●●●
VALUE FOR MONEY ●●●●●
OVERALL ●●●●●



In space, no one can hear you scream. Thats probably just as well when playing Uridium.

From the very first time you load it up until you finally manage to pull the plug in the wee small hours, this game has the sort of addictive quality that has "classic" written all over it. The eagerly awaited sequal to Andrew Braybrook's cult masterpiece "Paradroid", this game lives up to all the promise of its predecessor.

Out in the inky blackness of space, something is moving, and it ain't on your side. Fifteen leviathen battleships have moved into orbit around local planets and are sucking them dry of natural minerals.

Your mamba class fighter must tackle the surface defences of the enemy ship as well as the fighter squadrons defending it. The hard-edged, metallic graphics we've come to expect from Braybrook give the games a whole new feel which lifts them up above the rable and will leave Spectrum owners sobbing into their keyboards.

Controls are simple, the craft speeds up, slows down and moves up and down the screen. Changing direction is handled smoothly and effectively. When you slow down, your craft will eventually execute a "twinkle turn", a sort of space age Immelman, looping and rolling at the same time. This temporarily increases the fighter's height above the surface of the enemy ship. Nice if you're avoiding fire, not so nice if you're passing underneath some enemy fighters.

You start at the left end of the ship and work your way along. By destroying enough of the space ship's defences, you are able to land on the ship's surface. There then follows the only disappointing sequence in the game. Slightly reminiscent of the "Transfer" screen in Paradroid, you have to rapidly react as bonus scores flash up on the screen. This is, despite the usual polish, a little disappointing after what has gone before. This initiates the destruct sequence, so then its back to the surface, and skimming back along the ship as it disintegrates under you. After picking up your bonus for destroying complete waves of enemy fighters, its off to the next ship in the sequence. This bonus system is the killer. Once you've learnt the layout of the ships, it's a relitively straightforward task to shoot up the defences and land. But you can only get a big score by whiping out whole squadrons of fighters. The number of mambas lost chasing after that last elusive enemy only to hit part of the ship's hull can only be guessed at.

The speed all this happens at is quite mind numbing, at the other extreme slowing down allows you to appreciate the pixel by pixel scrolling twisting and turning with the enemy fighters.

All this frantic activity is accompanied by a soundtrack which makes the most of the Commodore's sound chip.

A game with classic stamped all over it, this game will appeal right across the spectrum of games players. Zap addicts will thrill to the speed and mindless violence of it all, whilst more sober elements will appreciate the exquisite detail. It looks like another programming dynasty is in the making. Future Braybrook games will probably have the same individual feel that marks out a Minter effort.

ROCK 'N WRESTLE

► CBM 64 ● Melbourne House ● Sports Simulation ● Julian Plumb ● £9.95



From the cinematic world of Kung Fu to the theatrical world of wrestling, Saturday afternoons with granny commandering the telly to boo Big Daddy will never be the same. Greg Barnett is at it again with his trusty Commodore and another savage combat game. The first truly three-dimensional combat game is the claim.

Ideally you should be softening up the opponent before you swing him, throw him or hit him on to the canvas, get on him and hold mim for the count.

You can execute all sorts of gruelling movements from reverse suplexs to pile drivers and atomic drops from behind. Sounds easy enough, just you try it.

Two player, or against the computer, there are ten opponents available, but to start with you'll be lucky to see more than the first contender, ranked tenth. It's hard enough to knock him out. Control of your "Rock 'n wrestle" wrestler is tricky; the joystick's eight directional axes were increased by the complex fire button and joystick combinations.

The ten wrestlers all of fictional design have really boring stereotype alliterational names like 'Vicious Vivian', 'Angry Abdul' and the image of 'Gorgeous Greg' your very own blonde hero.

The graphical display of the ring is stationary unlike in 'duck and sway' boxing simulations like Punch-Out yet, the display makes it difficult to calculate distance which is required in some moves, you can commit suicide by diving from the ropes, a body slam,m and totally misjudging your opponents position thus losing a considerable amount of valuable stamina power displayed on a bar graph displayed at the bottom of the screen.

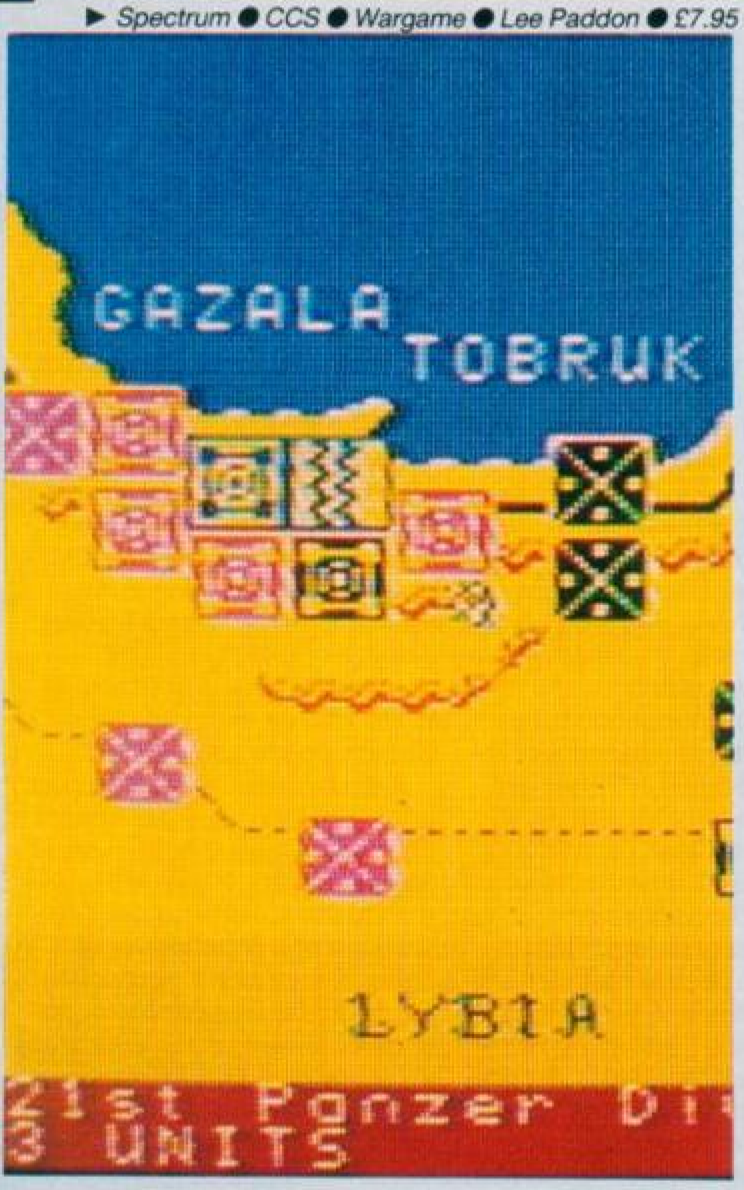
The boxers overall are the dirtiest bunch of fighters around in their tactics and the way they execute their moves but it is still a very entertaining game with a lot of playability.

If it goes down well with the mob that made Exploding Fist number one, Melbourne House could be rocking and wrestling all the way to the bank.

GRAPHICS
●●●●
SOUND
●●●●
PLAYABILITY
●●●●
VALUE FOR MONEY
●●●●
OVERALL
●●●●

DESERT RATS

► Spectrum ● CCS ● Wargame ● Lee Paddon ● £7.95



GRAPHICS
●●●●
SOUND
●●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●●

Of all the campaigns of WWII, that of the Western Desert is dearest to the heart of Englishmen. This is strange as for most of its course, it was marked by a series of disasters. Possibly it was the charismatic figures of Monty and Rommel, or the legend of the 7th armoured division, the eponymous Desert Rats.

Having chosen a strong subject, CCS have gone on to produce a rattling good game. Rob Smith, who Blitzkreiged the opposition with his first offering Arnhem, will have the foe raising the white flag with his latest tour do force.

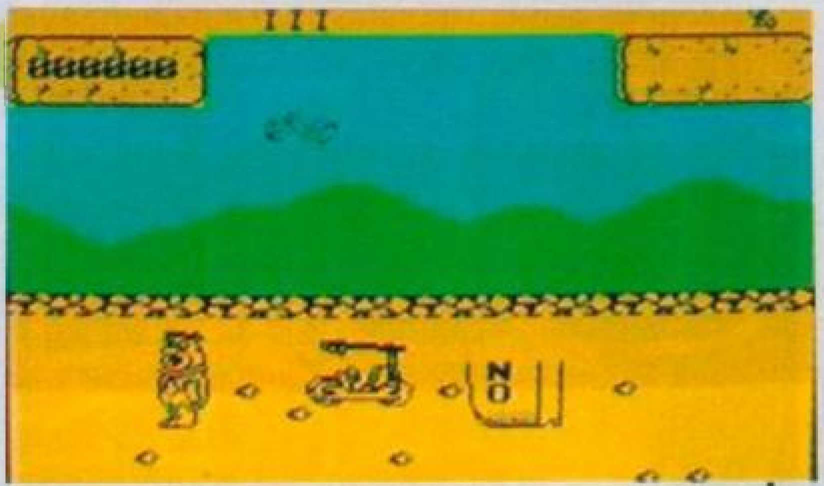
This may impress the shoot-em-up fraternity not one jot, but perhaps if you feel that a strategy game is the answer to insomnia, this might make you think again. The whole campaign, from Rommel's arrival to his final destruction over an area from El Aglia to Alexandria is portrayed. This takes slightly longer than skimming through War and Peace, so perhaps you might opt for one of the smaller battles which you should polish off in an hour or so.

Where to start on a description of the mechanics: the sheer detail defeats such a task. Suffice it to say, if you want to do it, the game will probably let you. The system captures beautifully the stop/go nature of the war. Months of preparation followed by a week or two of frantic manoeuver whilst you try to resolve the conflicting problems of conserving your supply lines, cutting your enemies whilst concentrating your forces to avoid piecemeal destruction. You also get the army-on-a-spring effect. The further you advance, the more your supply line gets stretched, and even if completely victorious, you could still be stopped by the well-timed arrival of a fresh battalion.

If you've steered clear of strategy games 'til now, this game could make you a convert.

YABBA DABBA DOO!

► Spectrum ● Quicksilva ● Arcade Adventure ● Lee Paddon ● £7.95



According to Douglas Adams, the secret of evolution is to "Just keep banging the rocks together guys". What he never told you is all the other things between stone age man and his hearts desire.

Fred Flintstone, one of Bedrocks founding fathers has his work cut out. Not only does he have to clear the building site for his dream house, throw a few boulders together and put in a hard day's work at the quarry, he also has to beware of homicidal birds, turtles and pterodactyls.

The object of all this leg work is to build a house fit for Wilma – his hearts desire.

So far, so bad. This might sound like just another rather tacky licensed game. A few pretty trivial tasks to perform, not much plot, five minute wonder. But wait, whats this? Beautifully drawn cartoon style animation. What lifts this game above the run-of-the-mill licensed production is the way the characters are drawn and the way they move. Thewse are not just jelletenous globs moving around the screen; you beleive in these people. This makes rejection by Wilma all the harder to take. This stone age flapper is usually to be found hanging around monolithic McDonald's and is only impressed by small talk involving long term endowment mortgages and split level bathroom suites.

The game is presumably aimed at the ancient kid market, since the Flintstones haven't been on the telly for some years now.

Hopefully it will set a new trend in licensed games. It might even set a new, possibly dangerous, trend in computer games. Whoever heard of a computer game where you had to be nice to people!

GRAPHICS ●●●●
SOUND ●●●
PLAYABILITY ●●●●
VALUE FOR MONEY ●●●
OVERALL ●●●●

TWISTER

► Spectrum ● System 3 ● Arcade Adventure ● Peter Luke ● £7.50



GRAPHICS ●●●●●
SOUND ●●●●
PLAYABILITY ●●●●
VALUE FOR MONEY ●●●●
OVERALL ●●●●●

Since the mists cleared from the Silurian Epoch, mans greatest fear has been the unknown.

Evil, the most feared unknown of all, has adopted many guises since the beginning of recorded time. Till now the Dark One, had only manifest itself in the hidden depths of your imagination.

Twister, the blackest-hearted of hades inhabitants, has ascended from the pits of the nether world, to pronounce the ultimatum of despair on the world of mankind.

To oppose the relentless onslaught of Twisters hordes, you must summon all your reserves of courage and cunning for the battles ahead. You alone are chosen to gether the elemental symbols that will enable you to defect the terrifying might of Twister.

In your first encounter with Twister's demonic acolytes, you must gather the four suits of cards. Ascending to the next level you must collect the characters of the word of power.

Travelling ever upwards, the next task is to collect the mystical signs of the zodiac then onto the planetry symbols. Delving further into the unexplored depths of your Id, you are confronted with having to collect the dismembered parts of Twister's discarded human form.

Twister knows you are now close to victory. Only one weapon, the psychic bolt, can exorcize Twister from your domain. To secure the supernatural weapon, you must conquer the gathered legions of Twister, the devil-spawn of Tartarus.

Once the demonry are vanquished, you must fire the psychic bolt down the foul throat of Twister. Only then can you claim to be victorious.

He who has dared to gaze upon the numinous visage of Twister, shall possess the knowledge of the unknown . . . or be possessed.

BACK TO THE FUTURE

► CBM 64 ● Electric Dreams ● Arcade Adventure ● Lee Paddon ● £9.95



"You don't need money, you don't need fame". What you do need is a mum and dad or you ain't gona be anyone!

You play the part of Marty McFly in this game of the film. Your major problem is your future mother is more interested in you than your future father. Telling her to get lost would of course be too easy – and anyway you shouldn't talk to your mother like that. So a bit of diplomacy is called for.

The game is Icon driven and rather reminiscent of Ocean's Frankie game. You have control of a character who moves along a screen and can enter doorways he passes by. There are four other characters wandering about: your parents, Biff and Doc. Biff is short on brain power but long on deltoids. He will spend most of the game trying to flaten you. An entire sub-game can be played sparring with this overdeveloped throwback. However, this is not the main object of the game. You have to keep your parents together, and thus hopefully make them fall in love. Your progress is shown by the family photographs on the screen. Five objects are scattered about the place and you can use these and see the effect they have on the other characters.

It's a simple game to pick up, although in the end it lacks the sort of depth you expect from graphic adventures. You have relatively few objects, few rooms and the object is simple if not particularly easy.

GRAPHICS ●●●
SOUND ●●●
PLAYABILITY ●●●●
VALUE FOR MONEY ●●
OVERALL ●●●


turbo esprit
DURELL
software getting harder
DS 1
With Technical Assistance from Lotus Cars Ltd.
turbo esprit
DURELL
Spectrum and Amstrad
R.R.P. £8.95
DURELL sales dept.
Castle Lodge, Castle Green, Taunton TA1 4AB
DURELL COMPETITION
Entry Coupon
Cut out this coupon and send it with a completed entry form included with any of the new Durell games.

SOFTWARE SHORTLIST

SKYFOX



► Spectrum & Amstrad ● Ariolasoft ● Shoot-em-up ● Lee Paddon ● £9.95

Not so much a flight simulator as a combat emulator, this game combines elements of the shoot-em-up with the skill needed to fly a simulator.

There are a variety of scenario's. You are defending your base against wave after wave of enemy attacks. Enemy tanks will home in your base and enemy bombers fly in on hit and run raids.

Your fighter is equipped with the usual arsenal: cannon, heat seekers and guided missiles. You've got shields, an on-board computer and can reach some really hairy speeds in this hi tech rubble maker. If you want to refurbish your shields and fuel, then its back to base. This is why it's vital to defent it. So watch the computer and take out anything that gets too close.

Just to make sure you don't waste valuable zapping time finding the enemy, you have autopilot, which finds the nearest badie as well as the radar and computer. With all this, it doesn't take much time to get stuck into the enemy, slugging it out.

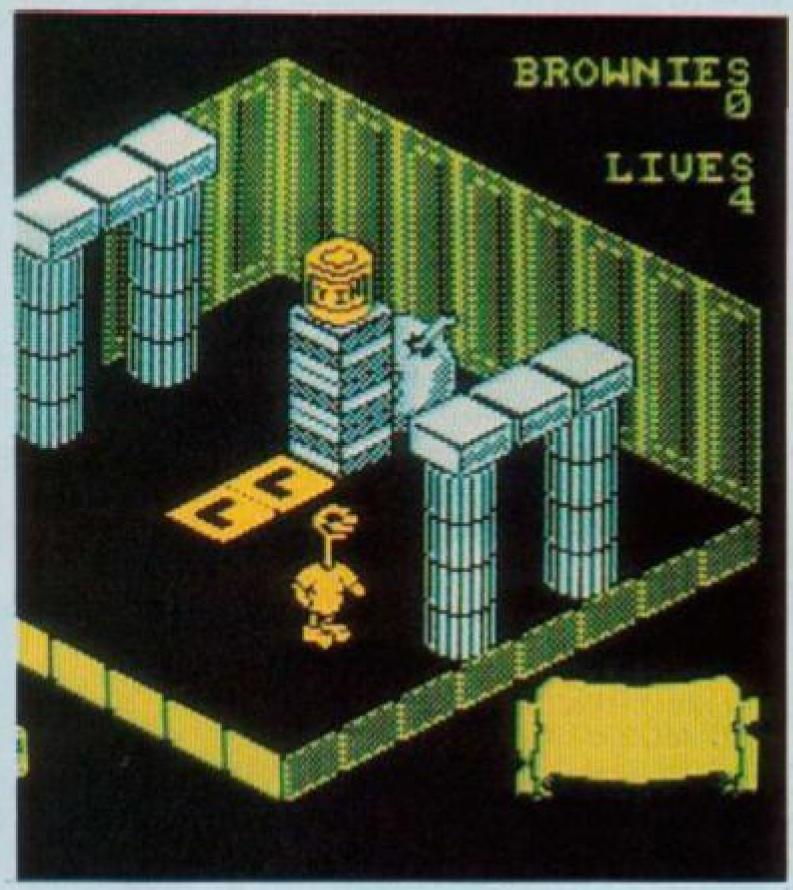
It is an immediately playable game – like any good shoot-em-up, but due to the large number of scenario's and levels, has lasting appeal. Below the clouds, the tanks trundle around the green swathe in nice detail with full perspective. Up above, the enemy fighters don't exactly swarm out of the sun like a squadron of deadly gnats – but you get the idea?

A total of 15 different scenarios will give you plenty to zap. A thinking man's shoot-em-up!

GRAPHICS
● ● ● ●
SOUND
● ● ●
PLAYABILITY
● ● ● ●
VALUE FOR MONEY
● ● ● ●
OVERALL
● ● ● ●

SWEEVO'S WORLD

► Spectrum & Amstrad ● Gargoyle ● Arcade Adventure ● Lee Paddon ● £7.95



GRAPHICS
● ● ● ● ●
SOUND
● ● ●
PLAYABILITY
● ● ●
VALUE FOR MONEY
● ● ● ●
OVERALL
● ● ● ●

It seems only yesterday that Ultimate suddently sprang on an unsuspecting world Knightlore, and the term Isornarphic adventure was born.

Since then, there have been legions of Knightlore clones, including Ultimat's own Alien 8, which was probably the best of the bunch. It combined beautiful graphics, humour and feindish problems.

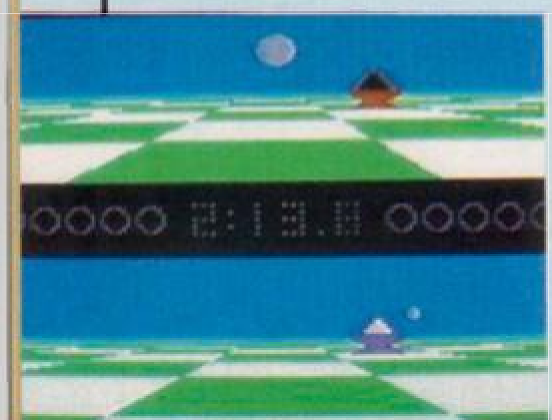
Since then, the Ashby brigade have gone off the boil with their later efforts. So in step Gargoyle. Previously, known for their various Monty Mole games, Gargoyle has obviously decided to get into the isomorphic act. The result is Sweevo which brings humour back into the genre. The whole slant of this game is light hearted. The idea appears to be to have a good time rather than worry about any of life's pressing problems.

Theoretically, you are trying to rid a maze of all the various nasties which inhabit it; but, well, live and let live I always say. Anyway, you've got enough problems just getting around the maze. Oh yes, mind the fruit.

Often this sort of humour manages to fall flat on its face after the first few games, but this is a genuinely humorous game with a good sound track and nicely drawn graphics which put even Ultimate to shame.

BALLBLAZER

► CBM 64 ● Lucasfilm ● Sports Simulator ● Lee Paddon ● £9.99



GRAPHICS
● ● ● ●
SOUND
● ● ●
PLAYABILITY
● ● ●
VALUE FOR MONEY
● ● ●
OVERALL
● ● ●

Mix Italian driving and Ice Hockey, add a pinch of Rollerball, stir well, and you'll end up with something like Ballblazer.

Lucasfilm gives us a vision of the Sports game of the future. No problems with pitch invasions, a forecefield around the edge of the pitch sees to that. It also helps keep the ball and the players on the pitch.

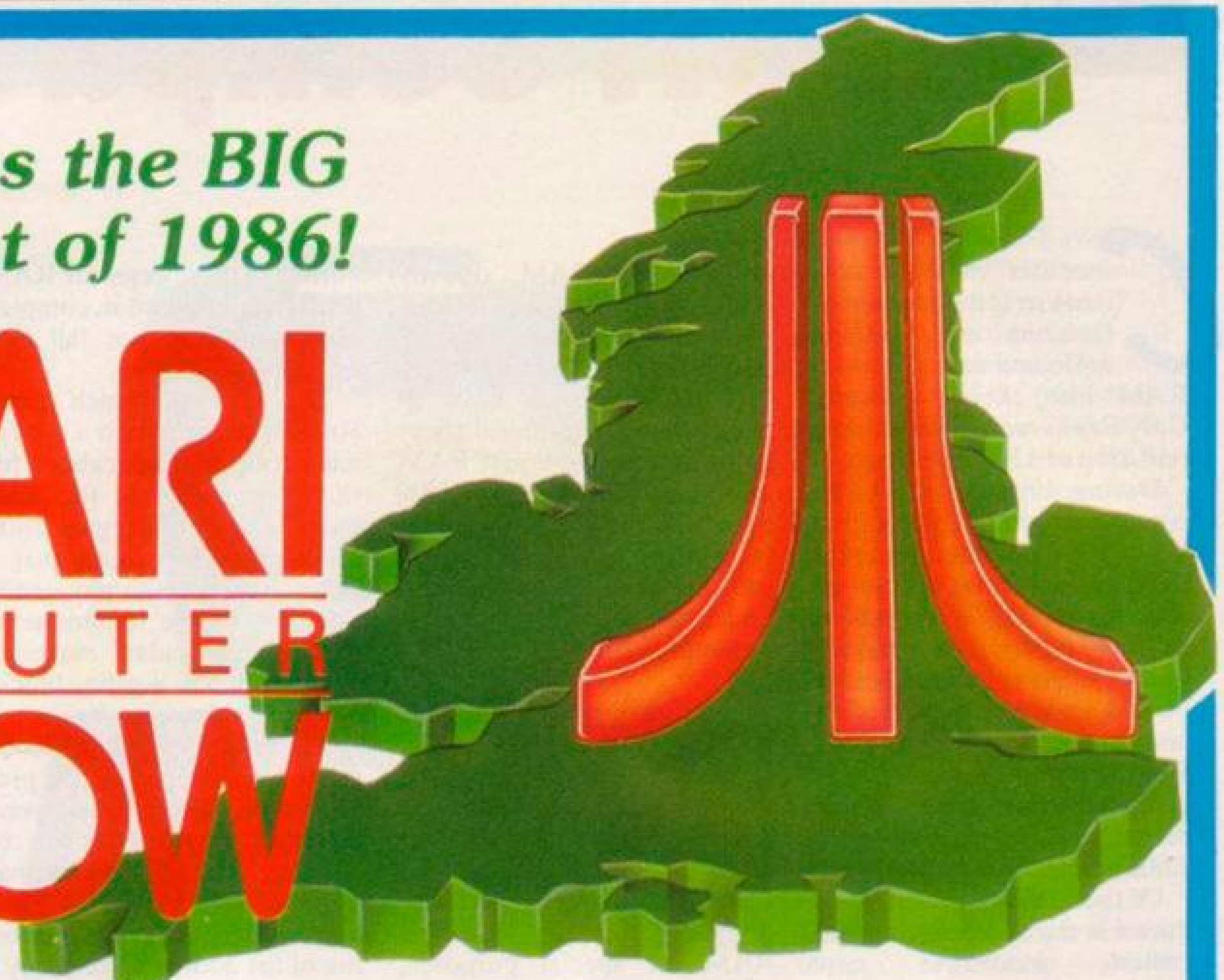
The screen is split and shows the view from your "rotofoil" you then have to find the ball which is trapped by the field round your rotofoil when you bump into it. Then the foil will rotate until it is facing the goal. Then you charge down the pitch, and fire when in range. Meanwhile your opponent is trying to stop you.

The game is fast and furious, rushing around a chequered surface. It's easy to get disorientated whilst rushing around the place and that's just when your opponent will strike.

One player against the computer or two players, it's fun

Don't miss the BIG Atari event of 1986!

ATARI COMPUTER SHOW



For the first time Atari UK and all the major suppliers of Atari hardware and software are pulling out all the stops to make the first-ever Atari Computer Show the top event of the year.

Everyone who's anyone in the Atari world will be there. Already many third-party suppliers are planning to use the show as a launching pad for products still on the drawing board.

If you're a long-standing Atari user the show will bring you right up to date on all the exciting developments now taking place in the ever-expanding Atari world.

And if you're one of the many thousands of newcomers to Atari computing it will open your eyes to the vast selection of Atari hardware and software that is now available for the whole Atari range.

It's a show you cannot afford to miss!

Champagne Suite, Novotel, Hammersmith, London W6

Friday	Saturday	Sunday
7 March	8 March	9 March
10am-6pm	10am-6pm	10am-4pm

'The Atari Computer Show will be a shop window for Britain and something that not even our American cousins have achieved'. – **Mike Reynolds, Sales Director, Software Express.**

'It will provide us with an opportunity to show the Atari consumer just how much good software there is in the marketplace'. – **Tony Deane, Marketing Director, Silica Shop.**

'There will be an exciting range of new products on display at the show'. – **Rob Harding, Sales Manager, Atari UK.**

Save £1 a head – and miss the queues! – by sending for your tickets now!

Please supply:

- ☐ Adult tickets at £2 (save £1) .... £ ______
- ☐ Under 16s tickets at £1 (save £1) .... £ ______

Total £ ______

- ☐ Cheque enclosed made payable to Database Publications Ltd.
- ☐ Please debit my credit card account

Access ____ ____ ____ ____

Visa ____ ____ ____ ____

Admission at door:
£3 (adults). £2 (under 16s)

ATARI COMPUTER SHOW

Advance ticket order

Post to: ***Atari Show Tickets, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

Name ....

Address ....

....

.... Signed ....

PHONE ORDERS: RING SHOW HOTLINE: 061-480 0171
Please quote credit card number and full address. YC 3

128K Computers

Computer memory now costs so little that manufacturers are building more and more bytes of RAM into their hardware. Gary Evans reports on the current crop of 128K machines.

During 1985, most of the companies with a stake in the sub-£500 computer market took to the market a machine which offered 128K of RAM as an integral part of its specification. Even Acorn finally bowed to commercial reality and produced a version of the BBC B micro, born as a 32K computer in 1982, which offered the respectability of a 128K complement of RAM.

Of the 128K machines introduced in the last year, few are radical, innovative new designs; most are upgraded versions of existing hardware. In some cases the extra RAM is well-integrated into the architecture of the system; in other examples the addition of extra RAM is unfortunately more of a cosmetic exercise, courtesy of the marketing department, the extra memory doing little to enhance the performance of the existing 48K or 64K design.

Dramatic fall

The reason so many computers have benefited recently from a generous increase in their complement of RAM is that the price of industry-standard memory devices has fallen dramatically in recent times. The reasons are twofold. The first is that memory devices are easier to manufacture than random logic ICs such as MPUs; various tricks of the trade mean that the cost to the manufacturer per bit of memory can be reduced to very low levels.

The other reason that memory became so cheap during 1985 was that there were too many people producing RAM ICs. That led to a saturation of the market and to the dumping of products at very low cost.

With the notable exception of the QL, the majority of low-cost computers are still based on 8-bit technology, which imposes a limit of 64K on the amount of RAM directly addressable by the microprocessor. Expanding memory beyond that 64K barrier means that manufacturers have to resort to some technical tricks to bring the additional RAM into play. That is done usually by organising the extra RAM into pages of memory which can be brought into action under control of the computer operating system.

Software support

That extra memory can be organised in a variety of ways but is usually configured in four banks of 16K, two of 32K, or as a single block of 64K. Some designers use the additional RAM for special purposes, though, for example as shadow screen RAM or as a printer buffer. In those cases the RAM is often configured in complex ways which do not fall into neat, logical, blocks.

The way in which extra RAM is mapped into a system has important implications for the programmer of the computer. An esoteric organisation of memory will mean that a programmer has to pay undue attention to the requirements of the particular machine. Time wasted in juggling blocks of code between banks of RAM is time which could be spent on more productive programming effort. An over-complex organisation of memory will also mean that only the experienced programmer will be able to make good use of the additional memory.

Given 128K of RAM to play with, it is unlikely that the average user will run into out-of-memory problems; even the most advanced reader surely would think twice about tackling a 64K plus machine code program. That takes us neatly to the point that any of the available 128K machines must be supported by software which makes use of the additional memory if the average user is to see any benefit in terms of computer performance. That is an important point and one which often is not stressed strongly enough.

Performance

When investigating 128K software for a particular machine it is worth establishing whether the package was written specially to take advantage of the extra RAM or whether it is a *modified version of an* existing 64K product. Some software adapted to work on 128K hardware does little to exploit the extra memory available to the programmer and, because of the overheads involved in handling the additional RAM, it is not unknown



SMALLEST MASTER

Acorn/BBC: At the start of 1986 Acorn launched a series of computers under the generic title of 'The Master Series'. The bottom-of-the-range machine is dubbed the Master 128 and retails at a price which just manages to scrape below the £500 barrier – £499 including VAT. The machine takes the relaible, well-known design of the BBC B micro and the later B Plus and 128 variants as a base but adds some impressive extras to the specification of those machines. The technology is 8-bit with a 65C12 – a version of the 6502 – MPU at the centre of the machine. The 128K of RAM is organised as a 64K block of main RAM, together with four pages of 16K bytes making up the rest.

The Master 128 features a massive 128K firmware, of which 35K is dedicated to the operating system, which supports extended graphics and terminal software facilities. Other features built into the firmware are disc filing systems, BBC Basic V4.0, a text editor plus the View (V3.0) word processor and Viewsheet, a spreadsheet program.

Many facilities of the new machine will be familiar, being largely the same as those of the BBC B, although there are important enhancements. The Master 128 provides two cartridge sockets to supplement the internal ROM sockets, while the 1MHz bus of the old machine has been upgraded to 2MHz.

Another interesting addition to the new computer is the provision of a genlock capability via additional cartridge hardware. Genlock allows the video output of the computer to be super-imposed on the video signals produced by a video recorder/camera. That ability will open many new application areas for the computer in the field of creative video.

While the hardware of the Master 128 is impressive, the major strength of any computer based on the design of the original BBC micro must be the volume of software available for the computer. To bring home that advantage, Acorn has published a series of software catalogues covering almost every conceivable application area. The general interest software guide is alone

for a 128K software product to produce an inferior performance to a similar package running on a 64K machine.

The types of programs most likely to benefit from an expanded memory are those which deal with large amounts of data. Word processors and spreadsheets are obvious examples, where the ability to hold far more data in RAM will reduce dramatically the time the computer has to spend reading and writing to its mass storage system. That will result in a considerable increase in the performance of a system.

Another application which should benefit from extra RAM is adventure gaming.

Before looking at some of the 128K machines available it is worth noting that, to get the best from any of them, the computer must be supported by some form of fast mass storage. While it is possible to use a cassette datacorder to load and save data in a 48K or 64K computer, adding extra memory will mean that a tape-based system will be unable to do justice to the rest of the system.

some 36 pages and lists more products designed for the computer than the total offered for some other machines. It should be pointed out, though, that as yet few of the products will make use of the extra facilities of the Master Series hardware.

The Master 128 is an impressive piece of hardware which offers a comprehensive range of I/O and support facilities. It is though, an expensive machine; adding disc drives, a monitor and a printer will take the total system cost to more than £1,000. There should be a healthy upgrade market for BBC owners who still have unexpanded 32K machines, as well as a queue of serious users not persuaded by the attractions of some of the newer 16-bit computers.

Master 128 costs £499 incl. Contact Acorn, 0223 245200.

FOR: Well-proven design.

AGAINST: Expensive when compared to some other machines offering similar facilities.



NEW LOOK GAMER

Amstrad CPC6128: The rise and rise of Amstrad in terms of its share of the home computer market faltered only slightly when the company launched the short-lived *CPC664* machine. The 6128 – the machine the 664 should have been – offers the familiar Amstrad bundled system approach to the marketing of its products and a value-for-money difficult to beat.

The 6128 is based on a Z-80 processor supported by both Amdos and the CP/M operating system. It features an adequate range of interfaces, including a Centronics printer port, a connector for a second disc drive to supplement the internal drive, and a 9-pin joystick port. In addition, a serial interface is available as an optional extra – it will allow the computer to be used with a standard RS232 modem.

The 6128 is capable of operating most of the software produced for other machines in the company range, excluding the PCW8256. The company claims that that more than 500 substantial programs are available for its machines. In addition, the fact that the computer is supplied with CP/M Plus means that owners have access to a wide base of CP/M software.

CP/M Plus is a version of the familiar operating system which includes code handling the bank switching of the memory within the machine. The 128K memory of the 6128 makes 61K of RAM available as the CP/M TPA, meaning that most of the popular CP/M programs – Wordstar *et al* – will run on it. A restricted TPA was the downfall of the 664 which, while it offered the CP/M OS, did not make sufficient RAM available for many programs to function.

The only disadvantage with some CP/M programs is that they can be rather expensive. The signs, though, are that that will change in the future, making plenty of low-cost software available to the CP/M user. Another point to watch is that all the computers in the Amstrad range use 3in. discs, as opposed to the more usual 5¼in. or 3½in. discs. Any software for the machine will have to be ported across to Amstrad format discs.

Amstrad 6128 costs £279.99 (green screen) £399.99 (RGB). Contact Amstrad 0277 230222.

FOR: Excellent value. Good software base, including access to CP/M software. Reliable design.

AMIGA FORERUNNER

Atari 130XE: A product of the new-look Atari and a development of the 800XL model. Although Atari has a reputation for producing games – playing machines as far as the U.K. is concerned, the 130XE is capable of serious work – word processing and the like. The extra RAM over and above 64K is brought into play by a machine code poke and most users will not find it easy to make effective use of the extra memory in their programs. While Atari has a vested interest in producing commercial software to support the machine, most of its efforts are tied up with the 520ST and the 130XE is in danger of being left in the cold.

Atari 130XE costs £139.95.

Contact Atari 0753 24561.

FOR: Good, reliable design. Well-supported by existing 800XL software.

AGAINST: Question mark over how well the machine will be supported by new commercial software. Extra memory must be handled by memory POKEs.



128K computers

continued from page 51

Commodore C128: While Commodore was one of the early stars of the home micro industry, the company image, and profits, have taken a battering of late. The company misjudged the needs of the market when it launched the ill-fated C16 and Plus 4 computers and while it has high hopes of the Amiga, the C128 has been brought to the U.K. as a stop-gap measure.

The C128 is an unusual machine, since it provides two fully-fledged processors in the same case and offers no fewer than three distinct operating modes. The first is designated the 64K mode and in that guise the C128 behaves as a Commodore 64 computer. In the 64K mode none of the extra facilities of the computer is brought into play; the advantage of 64K operation is that all of the software produced for the CBM64 may be run without modification. In addition, CBM64 peripherals may also be used in conjunction with the C128 in 64K mode.

The 128K mode operation makes use of the extra RAM of the machine, in addition to an improved version of Commodore Basic (V7.0). At present, the range of software written to operate in this mode is limited and in view of the declared Commodore intention to devote its efforts to supporting the Amiga, there must be a question-mark over the continued long-term support of the C128.

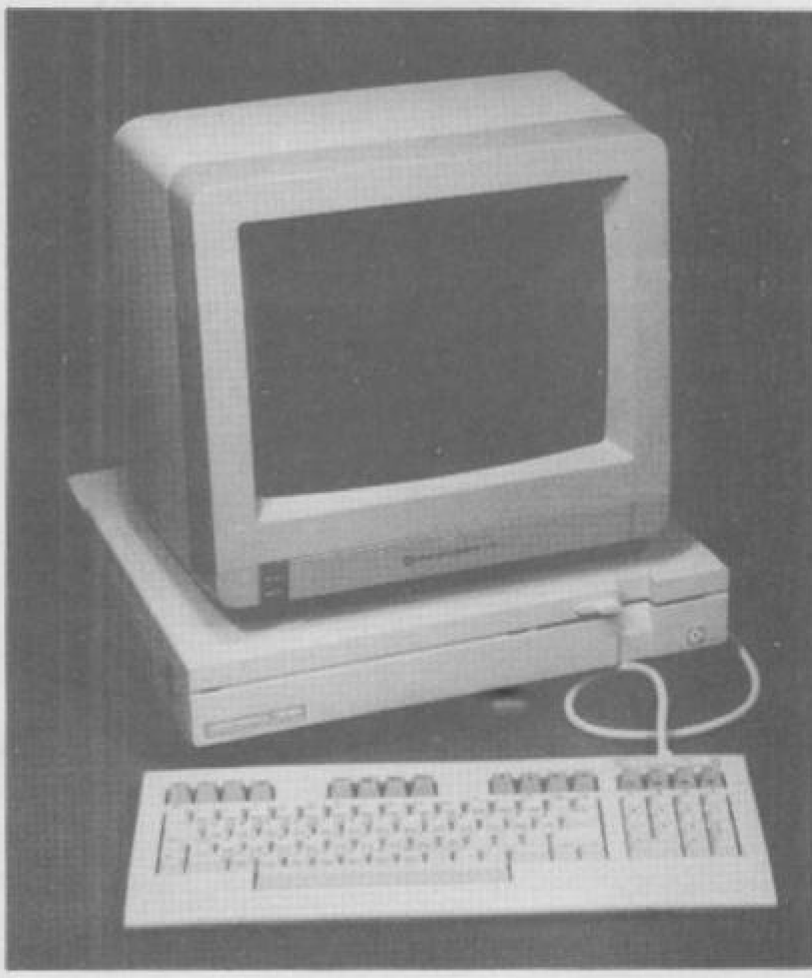
The final mode of the computer offers the most potential. That is the CP/M mode and, like the Amstrad computer, the C128 has adopted CP/M Plus. When used with suitable Commodore disc drives, the C128 can run a large range of business software available off-the-shelf.

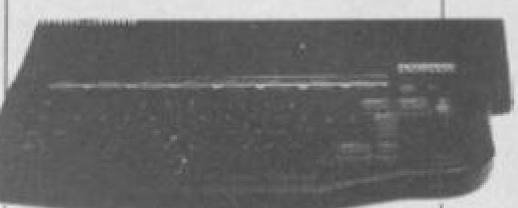
Commodore C128: Price £269.99.

Contact 0536 205252.

FOR: Well-designed hardware. Ability to run CBM64 and CP/M software.

AGAINST: Expensive when compared to the CPC6128, which offers a similar specification.





PIONEER

Enterprise 128: The Enterprise is a technically-advanced design which for various reasons failed to capture the imagination of the market. The 128K version was launched early last year, one of the first such designs to reach the market. Sales of the machine have never taken off, though, and that is reflected in a fairly limited software base. Like the Commodore, C128 the Enterprise does not compare favourably to the Amstrad CPC6128 in terms of value.

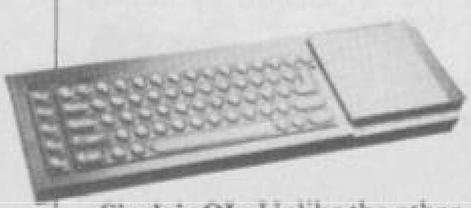
Enterprise 128: Price £249.95.

Contact 01 739 4282.

FOR: Advanced design. Good sound and graphics.

AGAINST: Limited software base. Expensive when compared to CPC6128.

SIR CLIVE SOLUTIONS



Sinclair QL: Unlike the other machines in this survey, the QL is based on a 16-bit processor, the 68008. Adopting a 16-bit MPU means that the problems of handling more than 64K of RAM disappear and the QL has no difficulty handling the 128K of RAM featured in the basic machine.

The QL has had a chequered history, although the early problems seem to be past, and at £200 it offers good value for those who want a 16-bit micro. While the basic price of the QL is less than £200, many users feel that disc drives are an essential peripheral; they will add considerably to the cost of a system.

The QL software base is still rather limited when compared to other 128K machines and, once again, there are question-marks over the long-term future of the computer.

Before leaving the subject of Sinclair, it is an odds-on bet that a 128K version of the Spectrum will be launched in the near future. Based on the design which made an appearance in Spain, the Spectrum 128 should add a new lease of life to one of the most popular computers in the U.K.

Sinclair QL: Price £199.99.

Contact 0176 685311.

FOR: Good value for those who want a 16-bit system.

AGAINST: Limited availability of software. Early machines unreliable, although present machines are less prone to failure. Microdrive mass storage system not adequate substitute for discs.

In conclusion, of the 128K micros at present available, it is difficult beat the Amstrad CPC6128 in terms of value. The design is well-supported by software; the ability to run CP/M Plus programs is a distinct bonus. For those who require an all-singing, all-dancing micro and are prepared to pay for it, the BBC Master Series should provide a suitable machine. For those who require a low-cost route to 16-bit computing and, in particular, 68000 machine code programming, the QL is an excellent choice.

As ever, it is a question of the specific application for which a computer is to be used which will dictate the choice of hardware/software combination for the job.

Mastering Midi

Writing your own DIY Midi software encourages an understanding of the system at the lowest levels. Dick Sargent has the low down on the techniques involved.

Home micros can make music

★ Some micros can be connected to keyboards.

★ Many Casio and Yamaha musical instruments are cheaper than computers.

★ Midi is an interface capable of connecting computers to musical instruments.

All those statements are true, except the last one, which is only partly true. Midi stands for Musical Instrument Digital Interface; it is not as yet a facility which is fitted as standard on most computers. A quick browse through the Yamaha and Casio catalogues reveals that only one of 37 electronic keyboards – the Casiotone CT6000 – appears to be blessed with that form of communication.

Midi museings

So what exactly is the Midi? A few months ago *Your Computer* described some Midi peripherals which could be bolted on to the BBC and Commodore computers. The peripheral approach still seems to be the way forward for computer-controlled music, unless you consider buying an Atari ST520, an Amiga, or a second – or is it third? – generation MSX machine with built-in Midi hardware. Even the new BBC Master Series does not appear to boast a Midi terminal.

Midi exists to merge the power of the micro with the superior sound quality of electronic keyboards and synthesisers. The computer provides the memory for the sequencing and manipulation of the stored notes while the VDU informs the musician what is happening. As many as 16 musical instruments can respond to computer instructions.

In 1983, the companies involved in the electronic music industry agreed protocols for the Midi interface and although the system is only just beginning to appear on instruments designed for the mass market, it is alive and thriving among professional musicians. The Midi agreement ensures that data can be exchanged between many types and makes of equipment with the minimum amount of fuss – which, in reality, means providing simple well-screened leads, simple connectors and foolproof software.

The Midi interface uses a serial data link which is similar to the RS232 protocol for printers and modems. Only three wires are needed, one for transmit, one for receive and one for the common return (ground). Voltage levels are 0 to +5V, which suits most computers admirably, and it is not uncommon to find the standard DIN-type audio plug and socket – 180° 5-pin – used to make the connections, with one socket devoted to MIDI OUT and one to MIDI IN. A third socket called MIDI THRU is often provided to allow equipment to be chained.

What is unusual about the serial interface is the speed of data transmission, which is 31K baud, nearly four times that of the fastest RS232 driver. Midi hardware uses the UART – Universal Asynchronous Receiver/Transmitter – to transmit data and control bytes with bit 7 set to zero for a data byte or set to 1 for a control byte.

Thus for every byte sent to the receiving equipment, bits 0-6 can be used to represent an exceptional code in the range 0-127, enough to encode a note range of 10.5 octaves. Middle C, incidentally, is number 60. On other occasions a byte is encoded differently. Bits 0-3 may, for example, represent one of 16 possible channels to which a note is being sent. It may sound complicated but the rules of Midi ensure that on its reception each byte is interpreted in the way which was intended at the time it was transmitted.

Midi uses a serial word format of one start bit, eight data bits, one stop bit and no parity, and so any UART used in the hardware must be set to that standard. Information on any particular note is compressed into three bytes – the channel number, the note value and the key velocity value. That makes the whole system about as complicated as sorting-out printer control codes on a strange printer using Basic.

It might seem masochistic not to use ready-made software which does everything for you but driving a Midi interface directly from Basic or machine code at least encourages an understanding of the system at its very lowest levels. For the purposes of the rest of this article, we assume that a do-it-yourself attempt at driving a Midi instrument from a humble Spectrum is the task in hand. Here is how it might be done.

In its simplest of forms, the "sound note" command takes the form shown in table one.

The note will continue to sound until either its amplitude envelope has terminated or a stop note command is received. In any particular CONTROL byte, only three bits are available to tell the Midi instrument what is hap-

Table 1

```
Byte One.    Bit 7     : High.          ie: This byte is a control byte.
---------    Bits 6-4  : HEADER CODE    eg: 001    A note will be triggered.
             Bits 3-0  : CHANNEL        eg: 0011   MIDI channel 4.

Byte Two.    Bit 7     :Low.            ie: This byte is a data byte.
---------    Bits 6-0  :Representing one of 127 notes (semitones) eg: 3C
                                                              Middle C.

Byte Three.  Bit 7     :Low.            ie: This byte is also data.
-----------  Bits 6-0  :Representing one of 127 velocity values.
                        A low value represents a lightly struck key. Be
                        prepared to send a dummy value to instruments
                        not needing any velocity information.
```

Table 2

```
1000cccc Note OFF
1001cccc Note ON
1010cccc Polyphonic key pressure
1011cccc Control change
1100cccc Program change
1101cccc Channel pressure
1110cccc Varies according to
         instrument manufacturer.
11110111 End-of-block terminator
cccc is the 4-bit channel code.
```

Figure 1

```
100 REM AMSTRAD AND SPECTRUM CODE
110 LET A=midi_port_address
120 OUT A,147:OUT A,60:OUT A,127:REM MIDDLE C START
130 FOR D=1 TO 400:NEXT D        :REM NOTE DURATION
140 OUT A,131:OUT A,60:OUT A,0   :REM MIDDLE C END
```

pening. 1000 is the "note off" code, and there are seven others, as shown in table two.

Midi interfaces tend to have ready-made software but for those who cannot resist a piece of DIY programming, there is plenty of scope for it where Midi is concerned, for simple single-note output can be done in Basic and figure two shows a hypothetical program segment that will sound middle C.

When playing complex chords, or sounding more than one Midi channel, Basic, is too slow and faster routines should be used to ensure that there is proper note synchronisation. That usually means resorting to machine code. If you want to write any machine code for your Midi you will need to know four pieces of information about the parallel-serial converter chip which lurks inside every Midi black box. To send a byte to Midi, you will need to know the address of register used to transmit DATA, the address of the register used to read the transmit/receive STATUS, and the position in the status byte of the bit which signified "transmit accomplished".

Taken as read

Receiving a byte from Midi involves using the receive DATA register and the STATUS register again and you will also need to know which bit of the status byte is used to signify "receive accomplished". Figures one and two show how Z-80 code might cope with those registers. Note that the BC-addressing variant of the machine-code OUT and IN is used in case the register addresses are in excess of 255. Figure one illustrates how notes 60 and 61 are sent in quick succession – they would certainly be heard simultaneously. Any reasonable number of notes could be placed at label NOTETABLE and they will continue to be sent until the F7 stop code has been detected. Interrupts are switched-off so that the data stream is not delayed by the computer operating system.

Reading a Midi instrument is less straightforward. Stage one, which should be established before the receiving code is written, is to decide what to do with the multitude of bytes which it is hoped will stream along the Midi connection. Figure three shows a portion of source code which will allow some experiments to be made. The subroutine reads the first 50 pieces of information from the Midi instrument into a designated area of memory, labelled PLACE_HERE. As with the transmit code, interrupts are switched-off but in this program the computer could hang-up in the R2-LOOP, waiting for a byte which never arrives.

Escaping from that situation could prove difficult. If all appears to go well, the received bytes should be examined to see if they are in Midi format; if that is the case the storage area can be extended to accept more data and extra code can be written to handle the raw data which accumulates there.

A Midi interface for the Sinclair Spectrum is available from Micro Musical Systems. Tel: 0203 616760.

Figure 2

```
NOTE_TABLE DB 147,60,127  ;1st note
           DB 147,61,127  ;2nd note
                          ;etc,etc
           DB 0F7H        ;End

SEND       DI
           LD HL,NOTE_TABLE
S1         LD A,(HL)
           LD BC,serial_device_write_data
           OUT (C),A      ;Transmit data
           OR A
           CP 0F7H        ;Terminator byte?
           JR Z,EXIT      ;If so exit
           LD BC,serial_device_read_status
S2         IN A,(C)       ;Read UART status and
           BIT x,A        ;wait for data Bit x
           JR Z,S2        ;(data transmitted) to go high
           INC HL
           JR S1          ;Go round again
EXIT       EI
           RET
```

Figure 3

```
RECEIVE    DI
           LD HL,PLACE_HERE ;Storage area
           LD DE,50*3       ;Size of it
           ;Now wait for Bit y (data received) to go high
R1         LD BC,serial_device_read_status
R2         IN A,(C)
           BIT y,A
           JR Z,R2
           ;A byte has now been received
           ;so read it
           LD BC,serial_device_read_data
           IN A,(C)
           CP 0F7H ;Is it the terminator byte?
           JR Z,EXIT2  ;If so exit
           LD (HL),A   ;else save it
           INC HL      ;Advance pointer
           DEC DE      ;Decrement count
           LD A,D
           OR E        ;if not zero
           JR NZ,R1    ;go round again
EXIT2      EI          ;else exit
           RET

PLACE_HERE DS 50*3     ;Storage RAM
```

Computer Club Guide



This is the start of the Your Computer clubs listing, developed in conjunction with the ALCC. In this issue we feature clubs from the London area only but we plan soon to expand the list to cover the country. If you would like your club to be included, send us details, including your club name, machine interest, address and telephone numbers of its organisers and when it meets.

68 MICRO GROUP
4th Tuesday of each month at 7.30 pm
Bimonthly newsletter
Jim Anderson 01-422-4724

BANK OF CREDIT AND COMMERCE
Bob Harvey 01-283 8566 Ext. 3873

BT & PO HQ COMPUTER CLUB
(British Telecom plc & The Post Office)
Room B47, Armour House, St Martin le Grand, EC2
All types of personal and business computers and microprocessors.
Chris Hibbard 01-432 2094 or Ken Costin 01-357 4554

CENTRAL LONDON COMPUTER CLUB
Mary Ward Centre, 42 Queens Square, WC1
1st Wednesday of each month from 6.30-8.30 pm
George Mortimer 01-242 8639

CROYDON MICROCOMPUTER CLUB
Central Reference Library, Katharine Street, Croydon
1st and 4th Tuesday of each month at 7.15 pm
Paul Chick 01-657 8127 or Vernon Quaintance 01-764 6556

EAST LONDON AMATEUR COMPUTER CLUB
Leytonstone Library, Church Road, E22
2nd and 4th TYuesday of each month at 7.00 pm
Fred Linger 01-554 3288 or Peter Wright 01-529 1663

HARROW COMPUTER GROUP
Harrow Arts Centre, Harrow Weald, Middx.
Wednesdays 7.30-10 pm
BBC Group 01-907 7430 PET Group 01-907 5355
Norman Campbell 01-863 5241

INDEPENDENT COMMODORE PRODUCTS USER GROUP SE Region
Charles Darwin School, Jail Lane, Biggin Hill
2nd, 3rd and 4th Thursday of each month at 7.30 pm
Jack Cohen 01-590 8849

KINGSTON COMPUTER CLUB
Kingston Library, Fairfield Road, Kingston
1st and 3rd Tuesday of each month 7.30-9.30 pm
Bob Southall 01-399 0898

LAMBETH COMPUTER CLUB
D. J. F. Badger, 35 Trelawn Road, Brixton, London, SW2 1DH

MILLFIELD COMPUTER GROUP
Millfield House, Silver Street, Edmonton, N18
2nd Tuesday and 4th Thursday of each month at 7.30 pm
Alan Gregory 01-803 0136 or Tony Gibbs 01-449 9619

NORTH KENT AMATEUR COMPUTER CLUB
Charles Darwin School, Jail Lane, Biggin Hill
Usually 1st Thursday of each month at 7.30 pm
David Pettet (0689) 23505

NORTH LONDON COMPUTER CLUB
Polytechnic of North London, Holloway Road, N7
Every Monday, Tuesday, Wednesday and Thursday during term time.
Polytechnic of North London 01-607 2789 Ext 2161

NORTH LONDON BBC MICRO USERS GROUP
The Prince of Wales, 37 Fortune Green Road, London, NW6
Tuesdays at 7.00 pm
Ric Keyworth 01-734 9235

ORPINGTON COMPUTER CLUB
GEA Hall, Woodhurst Avenue, Petts Wood
Every Friday 7.45-10.15 pm
Tony Self (0689) 31263

PEACE NETWORK
Sabine Kurjo 01-625 8804

QUEEN'S CRESCENT COMPUTER CLUB
Queen's Crescent Library, 165 Queen's Crescent, NW5
Every Tuesday at 7.30 pm
Robert Campana 01-267 3716

SOUTH EAST LONDON MICROCOMPUTER CLUB
Thames Polytechnic, Woolwich
Every other Wednesday at 7.00 pm
Peter Phillips 01-853 5829

SUTTON LIBRARY COMPUTER CLUB
Central Library, St Nicholas Way, Sutton
1st Friday and 3rd Tuesday of each month 8.20-10.00 pm
David Wilkins 01-642 3102

WALLINGTON COMPUTER CLUB
Wallington Library (Reference Section), Shotfield, Wallington
2nd and 4th Friday of each month 8.15-10.15 pm
Library 01-647 4458 (day) or Doug Mynett 01-647 2857 (evenings)

WANDSWORTH COMPUTER CLUB
West Hill Library, West Hill, Wandsworth, SW18
Charles Verrier 01-585 1720

WELLCOME COMPUTER CLUB OF DARTFORD
(Wellcome staff only)
Robert Varnes (0322) 56948

WEST LONDON PERSONAL COMPUTER CLUB
King's Head, Acton High Street
1st Tuesday of each month at 7.45 pm
BBC, Hardware and Communications sub-groups
James Tregaskis 01-451 5235 or Trevor Bell 01-579 5415

WORCESTER PARK COMPUTER CLUB
Windsor Road Library, Worcester Park
1st and 3rd Monday of each month at 7.30 pm
ZX; BBC; UK 101; Pascal
Simon Neale 01-669 2835

In this, the first of a new series on microcomputer clubs round the country, we look at Beebug, Britain's largest computer user group with a dedicated interest in the BBC microcomputer.

Based in a quiet back-street of St. Albans, Hertfordshire, Beebug is a short drive up the M1 from north London. Unless, of course, you take a wrong turn, but no-one would be so foolish. After 20 miles of M10 in the opposite direction from St Albans, your intrepid reporter was not so sure. Eventually I arrived, to be greeted by Beebug editor Mike Williams.

The small but efficient operation I found was surprising both in its bustle and in its sense of history. You might have thought that the tone at Beebug might be a little more subdued, given the rather reduced circumstances in which BBC micro manufacturer Acorn finds itself, but not so.

Beebug newsletter editor Williams admits that the group does not have so many subscriptions as it used to do but stresses the loyalty and enthusiasm of BBC users. "Since about April or May last year, our membership has been more or less even, with minor fluctuations; it is somewhere below about 30,000," he says. "The growth rate of the group has fallen in the last nine months and has become much more a steady situation."

Commitment

It was that kind of loyalty and commitment to a steady situation which led to the founding of Beebug. It was started by two computer enthusiasts in April, 1982, a few months after the launch of the BBC micro. Working part-time from home, Lee Calcraft and Sheridan Williams produced a small newsletter covering the more technical aspects of computing on the new machine.

Initially, the newsletter gave advice on programming alone, offering hints and tips for dedicated BBC users. In those early stages Acorn was either unaware of, or not revealing, many of the features of its computer.

Through Calcraft and Williams, the Beebug newsletter provided a centre for information, ideas and techniques to be shared with other users, all eager to develop their skills and understanding of the BBC.

One of the earliest members was Mike Williams, who later became Beebug editor. That demonstrates the nature of Beebug as a group of enthusiasts rather than an intentionally commercial organisation. Williams pointed-out that Beebug was one of the few places people could go for detailed technical information about the BBC when it was first released and that induced a great feeling of camaraderie among them.

Discount scheme

"The idea of belonging to a group of people who were particularly keen and enthusiastic, and among them were people who were learning about the BBC gave the group that sense of clubness," he reflects. Williams adds, however, that the feeling between Beebug and its members is now much more of a newsletter/reader relationship.

"Now, obviously so much information has been published about the BBC micro that that situation on longer exists," he says.

As the club grew, so did its services, which soon included a popular discount scheme, by which companies would offer price reductions on their hardware and software for the BBC to registered Beebug members.

The number of Beebug members grew apace for the first two years and continued to increase steadily, levelling-off and fluctuating during the last nine months. The present membership continues to rise as more BBCs are sold. A contract with Acorn to include details of the club in BBC boxes ensures that new buyers are aware of its existence.

The newsletter has always catered for people learning to program the BBC and it has remained faithful to the serious user. It contains articles on all aspects of the BBC, from the basics through to complex pro-

gramming techniques, and it also provides reviews of new products on the market, giving its assessment of their value. Other regular items are the news pages, hints and tips, and a large selection of excellent games and utility programs to be typed-in or bought separately.

At first the editors were dependent on the comments and articles of members to produce a worthwhile newsletter. Now a selection of regular contributors provide articles and programs on subjects in which they are specialists, so contributions from other members have to be sufficiently unusual and well-written to gain a place in the newsletter.

Perhaps the most unusual aspect of Beebug as a computer club, and a clear reflection of its success, is the development of a commercial side to the business. As the number of club members increased the two authors moved to a two-roomed office in another part of the town and employed their first member of staff, a technical assistant who celebrated three years with Beebug the day I visited.

More staff soon followed to cope with administration and readers' queries, and as the number of staff increased, so the premises expanded to accommodate them. Eventually Beebug became a limited company and had to move to bigger premises last April, to accommodate its ever-increasing number of employees, now 25.

Huge range

As contributions arrived from all parts of the country, so it emerged that some members had considerable expertise and talent from writing programs. That led to the establishment of Beebugsoft, a subsidiary of Beebug which has had considerable success as a software manufacturer and retailer. From the advice and comments of its members, Beebugsoft has developed a range of professional utilities for programmers and general users, written by Beebug programmers or commissioned by its members.

A range of approximately 22 programs is available, covering such aspects as sound, design, painting, icons and screen dumping, not to mention an assortment of programming aids, many of which are supplied on ROM to increase their power.

Software development led to a marketing department, which copes with the demand for goods at members' discount prices. Eventually the range of goods for sale became so great that a third part to the company developed, a showroom/shop where members could see the range of software and discounted products, as well as having the opportunity of meeting one or two Beebug staff and talking about the BBC.

Beebug now boast 30,000 members. A computer club on a grand scale.

Direct member contact has never been a feature of the club and there are no club meetings – it would be rather difficult with 30,000 people. While calls and letters constantly flood into the Beebug office, the only time members meet is at Acorn and BBC Micro user shows when Beebug exhibits its newsletter and software. Indeed, Williams remarks that often his regular contributors to whom he talks frequently to on the telephone introduce themselves for the first time at a show.

What began in two small rooms has developed into 15 offices, a reception and the new showroom, not to mention the enlisted help of distributors and other essential services. The day I visited, less than a week after the launch of the new BBC Master series, the staff was considering the implications of the new equipment on its now-vast enterprise.

Your letters

Write to: Your Letters, Your Computer, Suite 4, 1st Floor, 20-22 York Way, Kings Cross, London N1 9AA. Tel: 01-837 1686. Our Prestel mail box number is 01 9991 800.

Readers should note that because of our recent move from Sutton, Surrey to sunny Kings Cross the disruption caused has meant that a backlog of readers' letters has built up. We are answering letters as soon as is possible but a reply may take up to four weeks to reach you.

The French connection

I find your magazine very interesting and purchase it on a regular basis. I wish however to point out that, while the price charged for *Your Computer* in Britain is only £1.00, in France the price is equivalent to £4.80.

I would like to continue to buy *Your Computer* but the price charged over here is a little too much for my pocket. Could you please look into the reasons behind the high cost of the magazine in France.

Jacques Daffis
France

Editor's reply – Nearly five pounds does seem rather a lot to pay, even for a magazine as good as Your Computer. *The reasons have to do with various taxes that your government imposes on magazines imported from overseas and are beyond our control. Do not forget though that you can subscribe to* Your Computer *at a cost of only £22.50 for twelve issues. Buying the magazine this way works out far cheaper in the long term. (Details of the address to which subscription enquiries should be addressed can be found on page 14).*

Dear Jack Tramiel



If anyone wanted lessons in how to run a computer company they could do little better than to study your example. You are a dynamic leader and built Commodore up to be the world's biggest home computer company. A multi-billion multi-national. The parting of ways was acrimonious in the extreme. Since your departure you have taken every opportunity to show your wrath as wellas building up yet another computer dynasty.

The Atari of Warner brothers was overstaffed and badly managed. Unable to recover from the collapse of the video game market. Despite excellent product and cheap Asian manufacture they could not compete with you at Commodore. As a result they were a loss making company. This meant that when you departed from Commodore you were able to buy them for a song. Atari became the vehicle for your personal phoenix imitation.

Tramiel's Atari was a much slimmer organisation but with purpose and direction. Unfortunately also with very little money. Atari as that stage was very much a dinghy compared to the supertanker that was Commodore. Your advantage was that Commodore without you was like that supertanker in the English Channel with Frank Spencer at the controls. You attacked Commodore's eight bit market with a vengance, largely by giving better value for money. This resulted not only in more sales for Atari but also in Commodore being forced to reduce their prices as well. For Commodore reduced sales at reduced prices meant reduced profits. So reduced that they turned into losses. Having achieved results in the eight bit market you set about matching Commodore's future 16 bit plans. Despite a later start you beat Commodore to the market by producing a much simpler design. Where they went for custom components and system software you went for proprietory, readily available equivalents.

What is truly remarkable is how much you have achieved with so little. One superb example of this skill is your dealings with the press. Lacking the money to advertise on an adequate sacel you set about getting editorial column inches instead. Whilst the scale of publicity you have achieved is really amazing the nature of that publicity is even more so. Where most computer company bosses use such opportunities for ego massaging or "prestige" as they would call it, you instead create sales. It is nothing less than the sight of a master at his work.

You are now within range of making Atari the world's biggest home computer company. But for how long? The real threat now is not from Commodore. It is the Japanese who are after you and you know it.

Bruce Everiss

IN TOUCH
How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome you views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting you name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC and the Commodore which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068.

Let the buyer beware

Your article 'A Wolf in Cheap Clothing' (*Your Computer* February 1986) summed up the current discount computer scene very well.

Up to three weeks ago I knew nothing about home computers. I saw a 'bargain' computer with a well-known brand name and could not resist the buy. I relied on the sales assistant for information on software etc. I was told that there were over 400 games for the computer although I now realise that the games were for an older, more popular model and, of course, our computer is not compatible!

Our new machine came complete with four bits of built-in business software. Unfortunately it appears I need a disc to run them – I do not know what type of disc or where to buy or where to buy it and I thought I was buying a complete package with no need for extras.

I do not understand the manufacturers instruction booklet and because it is not a popular model there are no independant books on the subject.

All things considered, I have bought a Do-Do! – Let the buyer beware.
Cathy Bullions
London SW19

PS Am I the only woman interested in computers? Most of the games magazines seem to be aimed at men.

Editor's reply – Reading between the lines of your letter, we would guess that you bought a Commodore Plus 4 computer. If this is the case, then indeed you have bought a machine for which there is very little software support at present and for which there are unlikely to be any significant launches in the future. If as you state, the salesman claimed that there were over 400 games available for the computer, a fact which later proved to be false, you would seem to have a good case under consumer legislation in the form of the trade descriptions act. Having made a false claim at the point of sale, the shop from which you bought the computer would be obliged to refund your money. Proving such a case may be rather difficult, but many shops in an effort to protect their good will, may well give your case sympathetic consideration.

On the more general point of software support for budget priced computers it is interesting to note that the C16, again from Commodore, sold in large numbers in the run up to Christmas, quantities that were sufficient to attract the attentions of a number of software companies. Mastertronic in particular have a range of titles aimed at the C16. Sales of these titles are of a volume, that were they for the Spectrum or Commodore 64 – machines with a far larger user base – they would feature in the top 10.

It is then, not a matter of keeping clar of all budget computers, but of doing a bit of research before parting with your cash.

Scurrilous cant or fair comment

It is not entirely surprising that a jaundiced view should give rise to yellow journalism. But what really is amazing is that a respected publication like yours should open its pages to such a scurrilous cant.

I am referring of course to the tendentious twaddle published in the article 'Knight-Clubbing' (*Your Computer*, January 1986).

The fact is that nobody else in Britain has done as much for popular computing as Sir Clive has. If other Sinclair owners have derived as much pleasure and intellectual stimulation from their computers as yours faithfully has, then Sinclair has indeed served his public well.

As for the hit squad trio who wrote the article, I can only remind you the 'dogs delight to bark and bite', but they are, after all, only dogs.
Lawrence Humphery
Barcelona
Spain

Editor's reply – The feature on Sir Clive to which you refer was based on a great deal of research by the three authors concerned. Their aim, as stated in the opening paragraph of the feature, was to investigate the progress of Sir Clive Sinclair from a technical journalist on an obscure publication to his current status as both technological guru and Knight of the Realm. In getting behind the public image of the man it was not the author's intention to detract from the achievements of the man, nor to dispute the fact that computers such as the ZX81 and ZX Spectrum have brought enjoyment to many people.

The fact remains though that Sinclair's career has been one of ups and downs and some would say that of late he has lost the deft touch of a man able to identify gaps in the market and to launch technically innovative products. Here is not the place to gloat over the fate of the C5 nor to lament the lack lustre performance of the QL in terms of units sold. Indeed many people would see Alan Sugar of Amstrad as the current golden boy of the computer market. The success of the CPC64 and 6128 was only slightly marred by the CPC664's flop. The PCW8256 continues to keep Amstrad in the forefront of British computer manufacturers – the press and public eagerly awaits the launch of the company's PC like range of hardware.

It's not a body – it's a C5.



Classroom Computing

Used intelligently, computers can make the learning process an attractive proposition for children over a wide age range. Jason Ball gets into his short trousers to report.

This is the first of a new *Your Computer* series on computers in education, in which we will look at the development and use of computers in schools throughout the country. Starting with a child's first experience of computers in school, we shall follow the path of a would-be computer literate through prep school, college and university, showing how the use of computers diversifies, and the options open to those who follow this course. We start by looking at computers in one primary school.

Peckham Rye Primary School in south-east London was one of the first primary schools in the country to use computers as a part of the everyday curriculum. In 1979, Peckham Rye was selected, with another primary school, for sponsorship by a department of the Inner London Educational Authority which wanted to explore the prospects of computers in education. That sponsorship enabled the school to buy its first computer, a Commodore Pet.

Initial use of the computer was restricted to word processing and simple games such as *Hangman*. They captured the children's attention but did not offer many opportunities for group participation. Only a limited number of children can sit close enough to the screen to read the text, so classes had to be split into groups. Unfortunately, the first programs were so user-anti-social that teachers had to devote their attention to the group using the computer, leaving the remainder of the class to its own devices.

In those early days educational software was almost as scarce as educational grants to buy computers, so it was fortunate for Peckham Rye that one of its masters, Phil Redman, already owned a computer and had the then rare ability to write programs. The result was an avid interest in the Pet, with which the children were eager to play, little realising its role as a teaching instrument.

A year later ILEA decided to begin distributing computers to its schools in the inner London area, choosing Research Machines to supply 380-Z computers. Initially Peckham Rye received a single machine with dual disc drives, followed by another 380-Z and two 480-Z computers, chosen for their robustness and comparatively large memory. The most recent addition is, surprisingly, a home computer, the Atari 800XL, which will be put into use soon.

Learning Logo

Redman has developed the use of computers in the school to such an extent that they now play an everyday part in the curriculum. By splitting his class of 26 pupils, aged between eight and 10, into three groups, a sensible number can use the computer by themselves with little supervision. Alternatively, when demonstrating new or complicated programs, the class can be grouped round the computer.

By far the most successful development on the computer has been Logo, a program to teach children the basics of angles and addition.

Equipped with a computer and a copy of Logo, the children are left to draw pictures using commands such as 'LEFT 90 – FORWARD 35' to turn the arrow left 90 degrees and draw a line 35 points long.

The program is greatly enhanced for the children by a robotic turtle device which, after an intense group discussion, was called Timmy. Sitting on a large piece of paper, Timmy is controlled by an infra-red device and will duplicate any movement and draw pictures which correspond to the movement of the arrow on the screen. Apart from keeping their attention, Timmy allows the children to assess left and right more easily than with the arrow and they have something to show for their work – just what it is they can never explain.

The devotion of the group working on the computer was evident. Timmy was treated with enormous respect by the children, even though he is in almost constant use.

Unfortunately, some of the group were slightly over-zealous at the keyboard and their movement commands would extend an arm beyond the scope of human possibility, even beyond the edge of the paper.

Other developments on the computer have been pioneered by ILEA, written either by teachers or contracted professional manufacturers. So far two disc packs have been produced, each containing about 20 discs, an assortment of instructions and literature. The 60 or so programs cover a range of topics including English and mathematics, as well as co-operative databases incorporating information provided by community services like the Fire Brigade.

One ILEA program used extensively is called Devtray and produces pre-written sentences on the screen but omits all but one or two of the letters of each word. The letters are replaced by dashes, which the children can guess to earn points, or buy for points.

The development of computers at this level was summed-up at break time when the class left to go outside. Fifteen minutes later when they returned, those working on the computer were still there, completely unaware that they were doing overtime. Before they were eventually forced to leave the room, they accessed the notepad on Devtray and wrote "We are doing really well at this program" – and they were.



Your career

It is fun to buy disc drives, new games software and new micros but somewhere along the line you need to make the money to pay for it all. To help you get the job which will keep you in the money – or just get a job at all – *Your Computer* is instituting a new Careers feature. To start, we outline the job prospects in the computer industry with comments from people who do the hiring, firing and recommending.

We also will begin a series of collectable career profiles, which through the next few issues will provide a guide to the major types of jobs in the industry and what you need to get them. Here is the lowdown on the state of jobs in the business.

A few years ago, people started to think that if they could understand three lines of programming in Basic their employment problems were solved for life. Stories abounded about how computer whizz-kids made fortunes for themselves or their families and how a working knowledge of computing programming could make you a millionaire. We all – except those who became millionaires – now know that most of that was industry hype designed primarily to get would-be whizz-kids to buy home computers and that few will make fortunes by becoming programming wonderkids.

There is, however, a message of hope in the death of the rich whizz-kid myth. There are many new jobs which will require either a familiarity with computer applications or computer programming. The former is important, as it is certain there will be far more jobs for people using computer software than writing it. Nevertheless, the computer job market will consist of a mix of prgramming and applications-orientated positions. None of them is likely to turn you into an overnight star but most will go some way to paying your food, light and rent bills.

According to Paul Strange, personnel officer with the careers advice CAP (U.K.) group, graduates should, more than anything else, be keen on computing as a subject. "A reasonable level of numeracy but, more important, a genuine and considered interest in computing will enable many graduates to begin a career in this field," he says. "About 25 percent of graduates joining my company as programmers have arts or social sciences backgrounds, contrasting with a common misconception that a mathematical or computing subject are pre-requisites to a job application to computer industry employers. For those approaching employers for the first time, employers will want to see that you have done some homework."

George Penney, the National Computing Centre press officer, says that although there is a shortage of qualified people to fill about 12,000 jobs in the data processing business, employers still largely want fully-trained people. "Employers will now take trainees more readily than previously but most still want experience," he says. "The tendency is for bigger employers to take graduates and medium or small employers to take those from the NCC Threshold course and Job Training Schemes, although it is not absolutely essential."

Penney says the majority of employers still visit selected universities, polytechnics and colleges to interview candidates, inviting the best of them to visit corporate premises for further interviewing. You do not have to be at a polytechnic or college to get an interview for a career in computing but it helps if you have the proper qualifications.

Job experience is the best qualification but it is difficult to get real work experience without first getting the job. "It is a real Catch 22 situation," says Polytechnic of North London careers advisor Sue Harvey. She advises job seekers to look towards the post of systems analyst – see this month's Career Profile – or at least have a background in systems analysis.

Officials at the Kilburn Job Centre concur and suggest that people combine specialist knowledge with good general background skills. "We are finding that having multiple skills are important," says Mary Pierce. "There is a need for people with good computer skills which can be applied to problems."

You should now have a fairly good idea of the places to look for work in the computer business and in the next instalment we will outline some of the major training programs which will prepare you to face potential employers.

This month, *Your Computer* begins a new series of careers features. Over the next months we sh all present a series of collectable career profiles that will help you get a job in computing.

Job profile – systems analysis

Jobs in systems analysis are the most common and among the best in the computer industry. Computer users or data processing departments often employ systems analysts/programmers to develop useable systems for their companies. That involves helping to select and develop the correct hardware and software to handle a specific job. The systems analyst is sometimes called a system programmer or system developer.

The tasks of a systems developer are described typically in a recent advertisement in *The Guardian* by the credit card company Access.

"Being a service industry, we are very conscious of our public image and are proud of the service we provide to our customers. Our computers lie at the very heart of the company and our success or failure is totally dependent on them. That is why we need bright young people to join our Research and Systems division.

"Our computer staff – systems developers, including programmers, analysts and database designers – play a crucial role. Our basic framework relies on IBM 30XX mainframes operating under MVS and using BAL and Cobol for most of our development work, with on-line systems and under CICS. Most of the existing development work is based on IMS.

"As one would expect, the rewards will depend upon your experience but if you can recognise yourself in the brief job description these are the qualities you will need. You must have the necessary drive to achieve results. You must be a good communicator – it is no good having all the answers if you can't relay them to other people.

"We can offer you a starting salary of between £8,000 and £12,000, plus the kind of benefits you would expect from a large, successful company."

You will note the importance of experience, the desire for a familiarity with Cobol, Assembler and mainframe database structures. Systems analysts will often have to develop databases or tailor databases for their employers, particularly on mini or mainframe systems. A detailed description of training courses for systems analysts will be contained in the next careers column.



Telsoft

The programs given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemod 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

Hexloader

To enter the download program first type in the hex-loader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bits/ services.

When a program you want to

Figure 1. CBM-64.

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=680 TO 727 READA POKEI,A T=T+A
20 NEXT IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716 END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000 LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT PRINT"ADDRESS ERROR" GOTO 110
150 T=(A-32768)AND255 PRINTA; INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH" GOTO 150
190 FOR B=0 TO 7 B$=MID$(D$,2*B+1,2)
200 GOSUB 300 IF E=1 THEN GOTO 280
210 POKE A+B,D T=T+D NEXT
220 B$=MID$(D$,18,3) GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR" GOTO 150
260 A = A+8 IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8 NEXT GOTO 150
300 E=0 D=0 FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1) GOSUB 400
320 IF E=1 THEN D=N N=4 NEXT RETURN
330 D=D*16+X NEXT RETURN
400 X=ASC(C$)-48 IF X<0 THEN E=1 RETURN
410 IF X<10 THEN RETURN
420 X=X-7 IF X<10 THEN E=1 RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? "; T=(A-32768)AND255
530 FOR B=0 TO 7 X=PEEK(A+B) GOSUB 600
540 T=T+X NEXT PRINT"=";
560 Y=INT(T/256) PRINT MID$(H$,Y+1,1);
570 X=255 AND T GOSUB 600 PRINT
580 NEXT GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1); RETURN
800 SYS 680 C$=CHR$(34)
810 PRINT PRINT" TO RELOAD CODE  "
815 PRINT PRINT"  LOAD"C$"DOWNLOAD",
820 PRINTC$",1,1   (RETURN)"
825 PRINT PRINT"  THEN TYPE   NEW",
830 PRINT"  (RETURN)"
835 PRINT PRINT"TO RUN THE PROGRAM",
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT PRINT PRINT"1  ENTER DATA"
910 PRINT PRINT"2  PRINT DATA"
920 PRINT PRINT"3  SAVE DATA"
930 INPUT Z ON Z GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D0602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D0A02BA8E92CE=510
51032 ? 20CAC920C7C820F8=4D5
51040 ? CAAD08CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FCBD0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95B85FD=4F1
51096 ? A9CE85FE2028CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA9001D007A944=4FF
51128 ? 20D2FFA90085BA20=4B9
51136 ? 25CDA90820ABCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=4CC
51168 ? CE20D8C968A82025=4C4
51176 ? CD2095CC9848A906=4C5
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA90185=38A
51208 ? B885B998A293A0CE=539
51216 ? 20BDFFAEA9CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020D9CCC90DD00B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063CCA000A9=43F
51280 ? FF9993CEC8D0FA20=5FB
51288 ? D2CB90FB20D2CBB0=5ED
51296 ? FB8D72CEA0008C7C=4D0
51304 ? CE8C7DCE202ECCAD=4D4
51312 / 72CE29F0C980D0E4=5C6
51320 ? 20D2CBB0DA9973CE=599
51328 ? C8202ECCC009D0F0=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 0FA52B85FB18A52C=3D8
51352 ? 6D75CE85FC4CAAC8=587
51360 ? AD78CE85FBAD79CE=607
51368 ? 85FC20D2CBB0A820=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECCC010D0EA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CD7CCEF00DA95820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF4C7FC94C57=51F
51456 ? C8A0008C7CCE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E0CD7C=59E
51488 ? CEF000A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA0A9009993CEAD=506
51528 ? 84CEC902D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5BC7A9552016CD=3DF
51576 ? 20F1CB4C63C9AC77=4EF
51584 ? CE20D2CB88D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063CCA9028D=3E1
51664 ? 84CEA90B8D02DE60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCB=4D4
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E000F0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004694CE5=460
51744 ? C968C94190BFC947=4BA
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0AB9DC3CEE84CE5=61A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFCE8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CEC924D006A9=512
51824 ? 0F8DCDCEE8BDC3CE=5DD
51832 ? C9FFF01D20CBCAA0=5B2
51840 ? 3418BDC3CE6DCFCE=524
51848 ? 8DCFCEA9006DD0CE=566
51856 ? 8DD0CEB020E84C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE602025CD=4ED
51896 ? A200BD41CEC921F0=500
51904 ? 0720D2FFE84CBACA=570
51912 ? 4CDEC9ADCDCE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B005CECECFCED0E660=625
51960 ? 2063CCA90F8D0602=414
51968 ? A95185FDA9CD85FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD20A9CC20=3A6
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF600E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 20ECCC20CACCC900=40F
52032 ? D00D20FDCCC931F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 80CEAE81CEAC82CE=597
52056 ? 60AE92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA0002095CC=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE88D0FA8D93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 00F0F520D2FF80A9=50F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D0DAA920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00DE60A9=4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996188D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCE87CED0=677
52200 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC88D0FAAC82CE=616
52224 ? 602004CC8AA2A8CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECE20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7CCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCECAD0E160A000=516
52312 ? A9009900D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? A5A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC8B1FDC9=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20ABCC2095CC=46D
52392 ? 60A9058E81CEAAA9=4E6
52400 ? 2020D2FFCAD0FA4E=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=5C4
52432 ? 07C9DBB00338E960=4AF
52440 ? 60C941900EC95B90=494
52448 ? 08C9619006C97BB0=49C
52456 ? 024920604980A4800=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A6A6A0930C9=3CA
52536 ? 3A3003186907 20D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 30031869072 0D2FF=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532128205553=285
52624 ? 4520122053544F50=26D
52632 ? 209220544F205245=2C4
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 4144445245535320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 9D9D9D9D50524546=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4348415227532920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F21000000000000=0F0
```

A reminder of how to use the Telsoft service.

download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run.

Option 6 for CBM-64

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

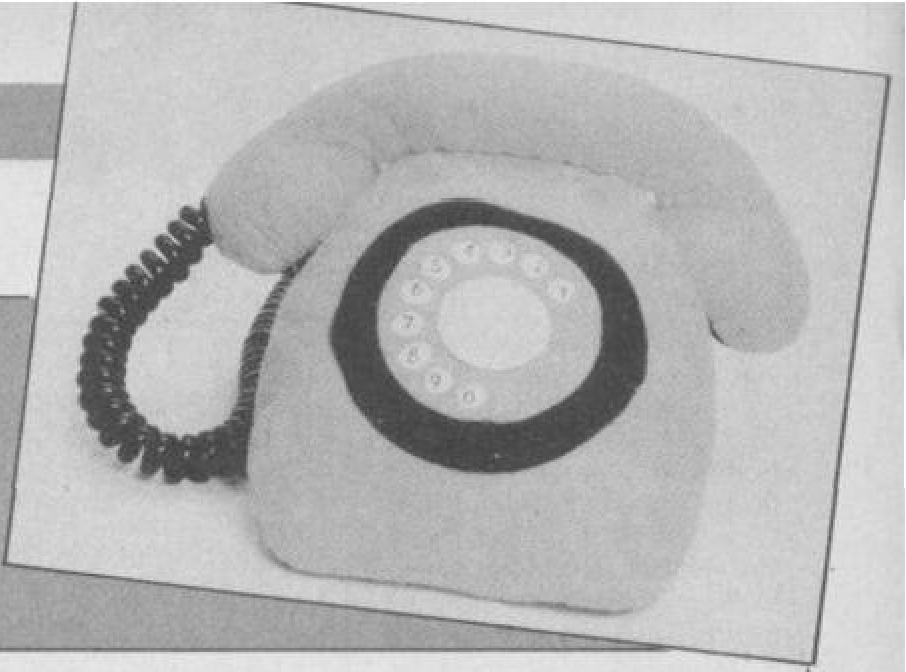


Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6F87 THEN 280
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9C8A0FEA20120F4,4C6
6A08 :FF20616C20486DC9,30A
6A10 :31F000C934F0E9C9,4C8
6A18 :35F0064C0C6A4C47,280
6A20 :6A990C20E3FFA9E8,482
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9C8A0,4C8
6A40 :FEA20020F4FF60A9,4BC
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA000,3E8
6A58 :A9FF0099056FD0FA,587
6A60 :A915A20120F4FF20,394
6A68 :0C6C90FB200C6C80,340
6A70 :F8A0008477047884,416
6A78 :79847A847B857020,380
6A80 :D56DA57029F0C900,409
6A88 :D0E2200C6C80D099,460
6A90 :7100C020056DC009,364
6A98 :D0F0A000A5742900,422
6AA0 :D000A51C857618A5,354
6AA8 :1D65738577200C6C,209
6AB0 :000520E3FFC02005,524
6AB8 :6DC010D0F0A57320,435
6AC0 :026D200C6C00A0C5,3CC
6AC8 :7AF000A95020E3FF,470
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C800CC570F000A9,40C
6AE0 :5020E3FF20E7FF4C,4AC
6AE8 :676AA573A009056F,43E
6AF0 :D00E20E7FFA90020,380
6AF8 :E3FF4C03684C676A,469
6B00 :A000047A047B200C,2C9
6B08 :6C00F2917620D56D,477
6B10 :CBC475D0F1200C6C,45A
6B18 :00E3C57AF000A950,4CE
6B20 :20E3FF20E7FF4C67,4B0
6B28 :6A200C6C80CFC570,3C1
6B30 :F000A95020E3FF4C,447
6B38 :676A20C76820E7FF,429
6B40 :A573A0A90099056F,3F6
6B48 :A58AC902D05020D7,419
6B50 :6BA9C820556CA955,380
6B58 :20306EA95020556C,290
6B60 :A915A20120F4FF20,394
6B68 :F768A471C8000905,505
6B70 :6FD05190D0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :0582A96F0583A907,3D7
6B88 :20006E20F86D20A0,2D0
6B90 :6DA90520006EA900,2DA
6B98 :20E3FF20F86DA9D2,502
6BA0 :20E0FF4C0C6AA955,30F
6BA8 :20306EA99620556C,2DE
6BB0 :4C6A6BA475200C6C,202
6BB8 :00D0FA200C6C200C,316
6BC0 :6C4C48684C6C6AA9,336
6BC8 :2020E3FFA96F20E3,43D
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A60AE002D0,41E
6BE0 :00A21320F4FFA212,307
6BE8 :20F4FF60A29720F4,4C0
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A60AE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6018A99685,44F
6C10 :0F847EA991A20020,38D
6C18 :F4FF8009C007D005,448
6C20 :6B684C0C6AA47E20,2D4
6C28 :496CC60FD0023060,374
6C30 :A58AC902D0062079,369
6C38 :6E00EC60A991A201,447
6C40 :20F4FF90A47E00DF,55C
6C48 :600AA2D2CAE0CAD0,5AA
6C50 :F8AA60A900047EA0,450
6C58 :20496C80D0FAA47E,449
6C60 :[illegible]9E0A000A2FF20,452
6C68 :F0FFA900050AA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9090502A9,2F0
6C80 :6F0503A00020F86D,39C
6C88 :20156DC941F000C9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA900A20120F4,335
6CA0 :FF4C876CA900A203,3C4
6CA8 :20F4FF4C876CA900,433
6CB0 :A20420F4FFE68AA5,4CE
6CB8 :7C20E3FFA47E20A0,460
6CC0 :6DA90820006E20F8,2C4
6CC8 :6DA01720156DC941,2D0
6CD0 :F000C942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A20420F4FF,3D6
6CF8 :E68AA58AC907D009,443
6D00 :A9E0A000A20120F4,3E0
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020A86D,2E3
6D18 :A90520006E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA905,36B
6D30 :20006E20F86D20A0,2DE
6D38 :6D847EA90320006E,2A9
6D40 :A9D220E0FF857C60,4D8
6D48 :A90C20E3FF20A86D,3EF
6D50 :A90720006EA99A85,306
6D58 :02A96E8503A00020,361
6D60 :F86D20A86D20996D,3C0
6D68 :20996D20996D20A0,317
6D70 :6DA90A20006E20F8,2C6
6D78 :6D20A86DA9022000,270
6D80 :6E20F86D20A86D20,348
6D88 :E7FFA9D220E0FF60,5A0
6D90 :A90FA20020F4FF60,3D5
6D98 :60A90820006E20F8,2B7
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF604029F06A6A6A,3FE
6DB8 :6A0930C93A300318,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031869,1F0
6DD0 :0720E3FF60457085,3AE
6DD8 :70A200A5702A900C,300
6DE0 :A57B4900857BA57A,390
6DE8 :4910857A267A267B,299
6DF0 :CAD0E86020E3FFC0,5AC
6DF8 :B102C90DD0F6C860,4F7
6E00 :067DAAA92020E3FF,478
6E08 :CAD0FAA67D60C97F,55F
6E10 :D000A90620F4FFE0,4FD
6E18 :00F012A97FC92000,3C3
6E20 :0EC90AF00AC90DF0,3A1
6E28 :06C907F002A90060,2D1
6E30 :057C867D047EA991,440
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF902902F0F4,4BA
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FF00,49F
6E68 :09C007D00560684C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60047E067DA996A2,446
6E80 :0020F4FF902901F0,3CD
6E88 :0BA996A20920F4FF,408
6E90 :9010900130A67DA4,340
6E98 :7E60444F574E4C4F,281
6EA0 :4144494E47204D45,215
6EA8 :4E550D3120202052,193
6EB0 :4543454956450D34,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2E6
6EC8 :0D35202020455049,100
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :204E554D4245520D,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C2D4720544F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0D53455420545241,200
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :6175640D42202033,1FC
6F30 :303020426175640D,209
6F38 :4320313230302042,180
6F40 :6175640D53455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,230
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6E0D5052,20D
6F70 :45535320414E5920,213
6F78 :4B455920464F5220,210
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k          fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :50EDCD47EE30F0CD,5AF
60024 :B0EDFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D0
60040 :15ED3EFACD04EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE06173E,3D2
60080 :20121310FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,580
60096 :30F03265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDE0EC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDE0EC0D,552
60144 :20F23A69EFE68020,51A
60152 :0021405C3A60EF0E,36C
60160 :0047092260EF0E00,1DA
60168 :11CDEECD1FED309A,47F
60176 :12130CCDE0EC79FE,45C
60184 :1020F03A60EFCD01,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEF0E20133E5011,326
60208 :E0CE12133E0012CD,340
60216 :D7ECCDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA2170,510
60232 :EF0E20E121E5EE3A,524
60240 :60EF056F3E000C67,3CC
60248 :3E000E2000CDD7EC,40F
60256 :3E2132005CC3FFE0,482
60264 :3E00326FEF3270EF,3C7
60272 :E05060EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :E0EC3A60EFFE0020,506
60296 :053A69EFE6003A73,432
60304 :EF12130C3A6AEF09,3FC
60312 :200CCD1FEDDAAAEA,5D0
60320 :216FEF0EC22DE0CD,504
60328 :1FEDDAAAEA2170EF,5A2
60336 :0EC22DE03E6F32E2,509
60344 :EE3E6032E3EE3E00,490
60352 :32E4EE3A005CFE21,501
60360 :2003CD15EECDD7EC,553
60368 :CDA6EC21E5EE3A60,5C5
60376 :EF056F3E000C6736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EFE00C20DEA23,4FC
60400 :0D20F63EFACD04ED,509
60408 :3E01D3FEC366EACD,5E0
60416 :1FED30FBC30DEAF3,594
60424 :0603AFD3FF10FB3E,3D0
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,305
60448 :320D5C32405C3E01,250
60456 :D3FE21915CC09EF0,560
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD04ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,50F
60504 :CDA0ECCD04ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :04EC23CDA3EC3E03,490
60528 :CD0FECCD04ECC9CD,600
60536 :A3EC3E07CD0FECCD,561
60544 :04EC23C97EFE00C0,520
60552 :CD00ED23C304ECFE,651
60560 :00C0F53E20CD00ED,520
60568 :F13DC30FECCDA0EC,65D
60576 :CDA3ECCDA6EC3E00,5A6
60584 :CD00ED3EFF320C5C,574
60592 :C9F513E6F0CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC6ECC6071213,498
60616 :F1E60FF630FE3AFA,606
60624 :D4ECC6071213C921,46C
60632 :CDEEE5CD04ECE106,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,530
60656 :77C50E007EA7CB17,449
60664 :30007EEE00773A6F,3C9
60672 :EFEE10326FEF3721,305
60680 :6FEFCB1623CB160D,350
60688 :20E2C1E1C9110501,394
60696 :216A00CD0503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C0
60720 :ED70E601F602D3FE,540
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED30E0C9CD,5F0
60744 :47EED0FEC0C037C9,5E6
60752 :F3D0FF3A01EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFD07FF1C9F53A,675
60776 :01EFFE0020043E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00D0FFE60037C8D0,59.
60800 :FFE60237C0D0FFE6,626
60808 :302004D07FA7C93A,3E0
60816 :01EFFE0020043E37,397
60824 :10023E36D3FFD07F,452
60832 :C9CD47ED3A73EFD0,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,7B0
60864 :7F2013CDF9EDFE0C,537
60872 :200CFE0D20053E20,20A
60880 :D73E0DD7101B3E20,34F
60888 :D73E00D73A005CFE,4E0
60896 :2120033E00D73E5F,2E6
60904 :D73E00D7F1E1D1C1,640
60912 :C9FE07201CFEC020,4F3
60920 :19FE0C2014FE0020,300
60928 :10FE0D200CFE20FA,367
60936 :0FEEFE00FA11EE3E,4BA
60944 :00C93E07C9CD600D,32C
60952 :3E02CD01163E1032,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E53E02,3E0
60984 :CD0116CD47EE30F0,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :305CC06F200C3A00,20F
61008 :5CF521305CC0AEF1,4C3
61016 :A7C937C9F5111000,3DE
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F4144494E47,204
61040 :204D454E550D3120,216
61048 :2020524543454956,276
61056 :450D352020204570,217
61064 :697420746F204261,32B
61072 :7369630D20205573,2DF
61080 :652053796D626F6C,393
61088 :205368696674202D,3B0
61096 :204700746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520290045,278
61120 :4E544552204E554D,309
61128 :4245522000000000,1C1
```

Hot Shots

The first task which must be done before any machine code routines can be tagged on to Basic is to find somewhere to put them. High-memory sites are the usual place for m/c bytes and on the Amstrad that means looking at locations near to &BFFF, since the top 16K (C000-FFFF) is occupied by both screen RAM and the Basic ROM. The top of the usable memory, HIMEM as its called, is nowhere near so high as &BFFF, because Basic needs workspace, the Z-80 processor needs a stack, and the tape – or disc – filing system likes to take 4K of RAM from time to time.

Also, if you are in the habit of defining dozens of little space invader characters, you could say goodbye to another 2K. To see how low HIMEM can get on your machine, re-set the computer and run the following program:

```
100 PRINT HEX$(HIMEM)
110 SYMBOL AFTER 0
120 PRINT HEX$(HIMEM)
130 OPENOUT "fred"
140 PRINT HEX$(HIMEM)
150 CLOSEOUT
```

The final HIMEM figure will be somewhere between &8EFB and &A2FB. The short routines used to illustrate this article will be placed between &8000 and &8E00 and HIMEM should be set to &7FFF, so that the routines lying above are protected from Basic. MEMORY &7FFF is the command needed to do that.

Both the RSX and the CALL use the same system to deliver information to the installed machine code routine and to receive back information from it. The system is flexible, efficient and even generous; 64 assorted numerical values and string characters can be inter-changed by any single RSX or CALL. The key to its efficiency lies in the use of a special stack set up by Basic and marked by the Z-80 IX register.

To show how it works here is a routine which loads a 16-bit number into two adjacent memory locations, the double POKE, sometimes referred to as a DOKE. The routine – figure one – is shown as a CALL from Basic. It can be changed into an RSX later.

```
CALL mc,&802F,65535    Emulating DOKE &8000,65535
19 bytes of code used.

              : 2 parameters are being passed (&8000 & 65535)      :
CP 2          : Register A should yield the number of parameters. :FE02
              :                                                    :
RET NZ        : If not 2, we cannot continue and must return!      :C0
              :                                                    :
LD L,(IX+2):  The first parameter,&8000, is available at IX2/3    :DD6E02
LD H,(IX+3):  so get it and put it into HL.                        :DD6603
              :                                                    :
LD A,(IX+0):  The last parameter, 65535, is available at IX0/1    :DD7E00
              : so put its LSB into register A.                    :
LD (HL),A     : And thus into &8000.                               :77
              :                                                    :
LD A,(IX+1):  Now the MSB into register A.                         :DD7E01
INC HL        : Advance HL to point to &8001.                      :23
LD (HL),A     : And put MSB into &8001.                            :77
              :                                                    :
RET           : DOKE complete, so return to BASIC.                 :C9
```

From that example three rules are apparent. The number of parameters passed is transferred to the A register. The last parameter typed on the Basic line is pointed to by IX+0 and IX+1. Other parameters, if there are any, follow in pairs and in each pair the lower IX i.e., the "even" IX – holds the Least Significant Byte of information.

Values are passed back to Basic via an integer variable, which must be declared before the CALL is made. Double PEEKs are DEEKs – what else could they be? – and if a machine code routine is constructed to perform a DEEK, the value found in memory must be passed back to Basic. Figure two shows the DEEK code, as a simple CALL.

```
A%=0:CALL &8042,&8000,@A%  Emulating A%=DEEK(&8000)
16 bytes of code used.

              : 2 parameters are being passed (&8000 & A%)         :
CP 2          : Register A should yield the number of parameters. :FE02
              :                                                    :
RET NZ        : If not 2, we cannot continue and must return!      :C0
              :                                                    :
LD L,(IX+2):  The first  parameter,&8000, is available at IX2/3   :DD6E02
LD H,(IX+3):  so get it and put it into HL.                        :DD6603
              :                                                    :
LD E,(IX+0):  The last parameter, A%, has an address which can    :DD5E00*
              : be retrieved from IX0/1.                           :
LD D,(IX+1):  DE now holds that address.                           :DD5601*
              : These last 6 bytes are not needed! See text.       :
              :                                                    :
LD A,(HL)     : This is a machine-code PEEK. It's the LSB.         :7E
LD (DE),A     : Put it into the LSB of A%.                         :12
INC DE        : Point at MSB of A%.                                :13
INC HL        : Advance HL for next PEEK.                          :23
LD A,(HL)     : Another machine-code PEEK. MSB this time.          :7E
LD (DE),A     : Put it into MSB of A%.                             :12
              :                                                    :
RET           : DEEK complete, so return to BASIC.                 :C9
```

The DEEK code illustrates two more rules. The direction of travel of information is denoted by the @ symbol. Thus, CALL mc,A% sends the value contained in A% to the machine code routine, whereas CALL mc,@A% sends nothing from A% but accepts a machine code generated value into A%. For an @A% transfer, the IX pointers indicate indirectly where to place the computed value, which is assumed to be an unsigned integer.

A string can also be transferred and the format for both sending and receiving is A$="M":CALL mc,@A$. The IX pair involved at the machine code end of the transfer will produce a number which is the address of three bytes elsewhere in memory; it is those which describe the string A$. The first of those bytes is the length of the string and the next two bytes are the address of the string. Once the address of the string is determined, the machine code routine can examnine the string, copy it or alter it.

The RSX system, in its simplest interpretations, is a way of giving names to machine code routines so they do not have to be CALLed by their hexadecimal address. Any name of reasonable length can be used, although it should not be the same as one already used by Basic or by an extension ROM utility. The name is preceeded by a bar symbol – to be found on the shifted-@ key – so that it is recognised by the operating system as an RSX

and not taken as a typing error. Setting-up a single RSX command such as DOKE uses 20 bytes, excluding the code of the DOKE routine. Further RSX commands require an overhead of only a few bytes and they are mostly the name of the routine. Figure three shows the assembly listing for four RSXs.

It is not difficult to think of routines to add to Amstrad Basic and armed, with the Amsoft *Concise Firmware Guide* which has the addresses and information about all the ROM subroutines of interest to machine code programmers, there is many a winter evening's worth of coding to be done. The trouble is that there are a host of extremely interesting RSXs already developed and tucked into commercial ROMs which plug into the back of the Amstrad. ROM RSXs do not take precious bytes away from Basic and are always available, so they are useful commands to have.

ENDZONE

The two final examples are PAN ,x which moves *the contents* of the whole screen sideways and PAN ,0,y which moves the whole screen sideways – there is a difference. Suggested values for x are 1-80 and for y 1-29. The effects of PAN ,x last while a program is running but normality is restored when Basic returns with the READY prompt. PAN ,0,y on the other hand causes more permanent lateral shifts and the screen can be returned to normal only by issuing PAN ,0,16 or simply PAN on its own. Note the space between the RSX name and the first comma, that being the required syntax.

TWIST ,c,r,n looks at a character on the screen at row r and column c and rotates it n times through 90 degrees, which is useful for creating vertical writing for labelling the Y axis of graphs. The machine code does not check the legality of c and r and a co-ordinate outside the limits of a screen mode will have unpredictable effects. It also uses the eight-byte storage area used for CHR$(255), so avoid using that character as a user-defined graphic. The listing of figure four loads the code for all four RSXs and then deletes lines 20 to 80, which ensures that subsequent RUNs do not re-initialise the RSXs and so confuse the computer. The program goes on to demonstrate PAN and TWIST; what you do with your RSXs after that is entirely for you.

```
                      : The INITIALISATION code.
                      : ------------------------
LD BC,COMMANDTABLE    : Where the addresses of all the routines are held.
LD HL,BUFFERSPACE     : A 4-byte area of scratch-RAM.
CALL &BCD1            : Inform the operating system that the RSX exists.
RET                   : RSXs initialised, so return.
                      : 10 bytes of code so far.

BUFFERSPACE           : This is 4 bytes of storage.

                      : The COMMANDTABLE takes this form.
                      : ---------------------------------
NAMETABLE             : 2 bytes, the address of the RSX's names.
JUMP 1                : 3 bytes in the form of C3 aa aa where aaaa is the
                      : address of the the first RSX routine.
JUMP 2                : The jump for RSX routine number 2.
JUMP 3                : And so on...
JUMP 4                : The final jump in our example.
                      : 14 bytes

                      : The NAMETABLE itself.
                      : ---------------------
DOKE                  : 4 bytes, the last having bit 7 set high.
DEEK                  : 4 bytes.
PAN                   : 3 bytes.
TWIST                 : 5 bytes.
00                    : 1 byte end of table marker.
```

```
10 REM DEEK, DOKE, PAN & TWIST
20 REM AMSTRAD RSXs R.SARGENT 1985
30 REM First load the machine-code
40 MEMORY &7FFF
50 FOR A=&8006 TO &80DD
60 READ D$:POKE A,VAL("&"+D$):NEXT A
70 CALL &8006:REM INITIALISE RSXs
80 DELETE 20-80
90 REM Demonstration of PAN & TWIST
100 MODE 1:BORDER 12
110 FOR X=1 TO 130
120 PRINT "ABCDEFGH";:NEXT
130 FOR N=1 TO 30
140 FOR X=1 TO 40:NEXT
150 |PAN ,N:NEXT
160 FOR N=16 TO 29
170 FOR X=1 TO 40:NEXT
180 |PAN ,0,N:NEXT
190 FOR N=29 TO 16 STEP-1
200 FOR X=1 TO 40:NEXT
210 |PAN ,0,N:NEXT
220 FOR R=1 TO 25
230 FOR C=1 TO 40
240 |TWIST ,C,R,1:NEXT
250 NEXT

900 DATA 01,10,80,21,02,80,CD,D1,BC,C9,1E,80,C3,2F,80,C3
901 DATA 42,80,C3,52,80,C3,7A,80,44,4F,4B,C5,44,45,45,CB
902 DATA 50,41,CE,54,57,49,53,D4,00,FE,02,C0,DD,6E,02,DD
903 DATA 66,03,DD,7E,00,77,DD,7E,01,23,77,C9,FE,02,C0,DD
904 DATA 6E,02,DD,66,03,7E,12,13,23,7E,12,C9,B7,28,21,FE
905 DATA 02,28,04,EB,C3,05,BC,7B,FE,01,D8,FE,1E,D0,B7,C6
906 DATA 1E,F5,01,00,BC,3E,02,ED,79,01,00,BD,F1,ED,79,C9
907 DATA 3E,2E,18,ED,FE,03,C0,3E,FF,CD,A5,BB,D0,22,00,80
908 DATA D5,DD,6E,02,DD,66,04,2D,25,E5,CD,93,BB,CD,2C,BC
909 DATA ED,5B,00,80,CD,56,BC,E1,D1,43,CD,BB,80,10,FB,E5
910 DATA CD,78,BB,D1,E5,EB,24,2C,CD,75,BB,3E,FF,CD,5D,BB
911 DATA E1,CD,75,BB,C9,E5,2A,00,80,F5,C5,0E,08,E5,06,08
912 DATA CB,3E,17,23,10,FA,E1,F5,0D,20,F2,0E,08,09,41,F1
913 DATA 2B,77,10,FB,C1,F1,E1,C9
```

The master 128

When Acorn Computers won a contract in February, 1981 for the BBC Computer Literacy Project, the company was required to design and build a computer which achieved the ultimate in standardisation, expandability and versatility. The resulting BBC micro speaks for itself, particularly with the speech upgrade, since it represents nearly 80 percent of micros bought by schools in the U.K. Now, four years after its release, Acorn has re-designed the machine to produce the Master Series, bridging the gap between the home and business computer markets.

The Master Series contains five micros, developed directly from the BBC B and B+, and is based round a single model, the Master 128. Using a CMOS low-power version of the BBC 6502 CPU, the Master 128 has enormous expansion potential to cover all aspects of home, educational and business computing.

Externally, the new series is slightly different in appearance, with a raised top to the machine and the addition of two ROM cartridge sockets like those on the Electron. Acorn obviously has re-assessed the original BBC micro objectively and we found that the resulting external improvements to the machine were near perfect.

Key features

First, the removal of the redundant BBC ROM socket/ash tray has left room for the addition of a numeric keypad to the right of the main keyboard, with 19 independent user-re-definable keys. The BREAK key has moved one inch to the right of the function keys and is now lockable, so preventing lost programs when you miss Function Key 9, while the cursor keys have been re-arranged logically, into north, south, east and west positions. The LED indicators have also moved to the top left corner, so they are not covered by the left hand as you type and the often-redundant cassette motor light now indicates power on.

Finally, the raised level behind the keyboard improves the viewing angle of any function key cards and makes them more accessible. Unfortunately, it also makes the new machine unsuitable for most available monitor stands, as does the 4cm. extra width of the machine. The external ports have been re-organised and there is an additional phono link which allows for connection to external speakers or a pre-amp. A small perforated square at the rear of the machine will allow access to a free space on the main internal board for future additions. Otherwise all the facilities of the original BBC remain.

ROM with a view

Internally, the Master 128 has been completely re-designed and contains little more than half the original BBC number of chips, five of which are custom-made for Acorn. Based round the 65C12 2MHz chip, the new machine is almost as fast as the present Acorn second processor. That was achieved by using the chip's extra instructions to recode BBC Basic, thus increasing its speed and allowing new commands for error-handling and debugging to be added. The result is BBC Basic Version 4.0.

One outstanding feature of the Master Series is a 128K chip which contains the machine operating system and more than £200 worth, at Acorn prices, of bundled software. Incorporated into the chip is Acorn enhanced Basic – including extended graphics commands – the View word processor; Viewsheet – its accompanying spreadsheet; a terminal program, a program editor, and two disc filing systems. The latter is necessary to maintain compatability with existing BBC software, while also providing a double-density interface to complement the enhanced machine.

Unfortunately, while those filing systems will not necessarily affect the page number, the extra memory of the Master 128 – 64K main memory and four pages of 16K RAM – can cause problems with some programs. They usually occur with complex programs which use illegal areas of memory. They tend to be games or complex utilities, the classic examples being Elite. Generally any basic program will run, and approximately 80 percent of machine code programs also work. Future programmers will just have to stay with the rule book but how future owners will be protected is yet to be seen.

Certain areas of this memory have been set aside for future Acorn use, third-party applications, firmware and 50 bytes of battery-backed memory, incorporating a real-time clock and allowing the machine to start up in any specified configuration.

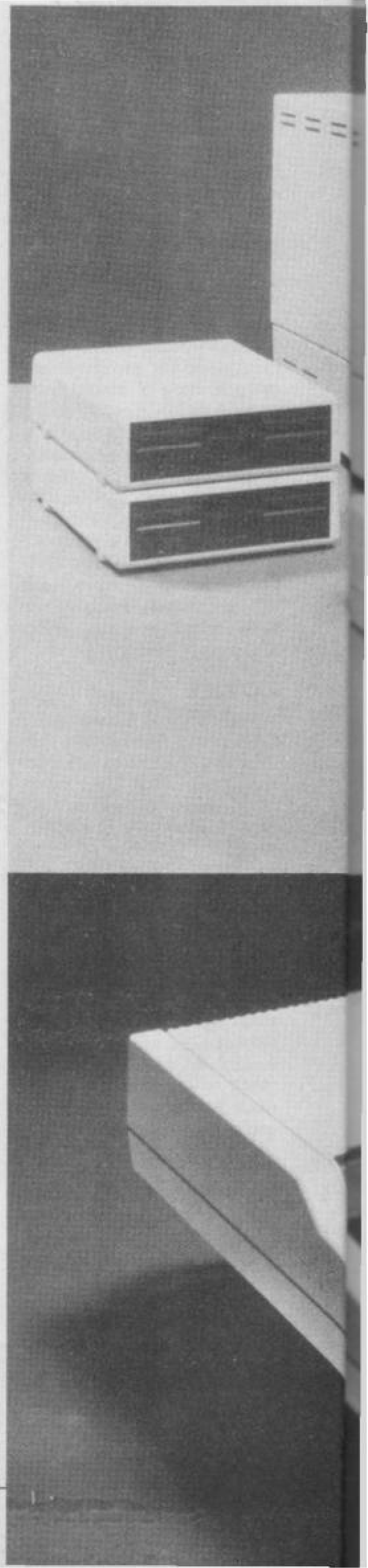
The new external ROM system gives the machine enormous potential; each socket can support either a ROM of up to 256K, a 2MHz bus, sound input and output, or a video disc. Those two sockets are in addition to three located inside the micro but no longer beneath the keyboard. They accommodate the same cartridges and software as the Electron and will either be sold containing ROM software or as empty cases to software manufacturers and the public for other ROM software.

Paying for potential

The maximum of 16 ROMs remains and there are naturally no expansion boards yet designed to fit the new interior. The cartridge system and new ROM DFS, however, should solve the problem of conflicting ROMs and, combined with a cool, re-designed power supply, you might even be able to keep the cover screwed on.

The Master series is dependent on two internal slots which act as a second 'Tube', accommodating one of three expansion boards, each of which is in effect a second processor and will accommodate one of three. They are installed easily by the user or provided within the appropriate machines in the range. Thus the basic model, priced at around the £500 mark, can be expanded to the highest £1,000 model in the series.

Present BBC owners should be warned against using the







The new master series of computers show that Acorn is back on its feet. We have details of the baby of the family – the Master 128.

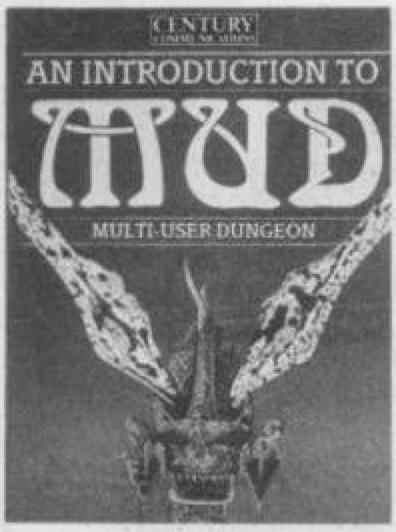
new Master 128 because if you spend more than a few minutes playing with it, you will want one. It will be considered by some to be largely over-priced in terms of specification and value but, more than any other home computer, you pay for the potential. You may begin with simple programming in BBC Basic, renowned to be one of the most user-hospitable languages, but you can also develop a complete business system incorporating such facilities as Graphics Environments Manager software, a mouse, hard disc storage, networking, robotics, even a laser printer, all without restrictions on make or model.

From a business point of view, the Master Series is a range of semi-professional micros for people who want to learn how the computer can improve their productivity. While maintaining its simple approach – you almost need a degree to program an IBM – Acorn has developed a machine which has the technical capabilities to be used as a business machine. Many restrictions on the original BBC have been removed; there is even an MS-DOS option which allows you to read and write files created on the office IBM or compatibles.

Which market?

The new BBC is unlikely to be a best-selling home computer and it may have difficulty making its presence felt in the business market. It is, however, well-constructed and a joy to use compared to many other micros. Any BBC users who want more power should examine this new offering and may find it difficult to refuse.

Choices



Danger – MUD can seriously damage your health – particularly when used frequently at 3am. Duncan Howard's latest book delves deep into this mysterious subject that has attracted so many, and gripped them with a fanaticism that causes dark rings beneath the eyes.

Multi-User Dungeon was conceived by Roy Trubshaw at Essex University in 1980. Its popularity among students and later outside callers was sufficient to warrant a dedicated system on which to run the game, and it has now been taken on by several universities and companies, including British Telecom.

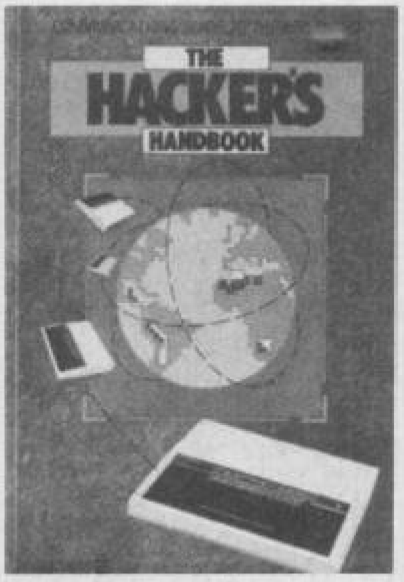
The sheer complexity of the game is reflected in the title of Howard's book An Introduction to MUD – although the book goes much further than an introduction. MUD can be played by anyone with a home computer with a serial RS232 port, and a modem, and is described by British Telecom as 'the most advanced, interactive, computerised adventure game in the world.' As a player your actions are unlimited, but the places, situations and results you encounter are determined by the many other players on the system.

The main object is to survive and eventually gain the title of Wizard. To do this you can talk to other players, including intelligent computer generated characters, form alliances with them, cast spells and either fight or help whoever you meet.

The book outlines the development of MUD, the commands used in play and the different locations and characters you are likely to meet in the game.

'People play MUD from all over the world. One morning recently among the players were one from Japan and two from the USA, one in San Francisco, the other in New York.' As a computer enthusiast I found the book very interesting, even though adventure games usually bore me to tears. Unfortunately I'm now eager to try the game, but at £1 to £3 an hour plus telephone charges you could be taking your life into your own hands in more ways than one.

An Introduction to MUD
Publisher: Century Communications
Softback – 90pp
Price: £4.95



The BBC version of Geof Wheelwright's and Ian Scales' Hacker's Handbook – nothing to do with a book of the same name published by Century – cannot really be classed as a guide to hacking into online databases.

The book is actually more of an all-round guide to communicating with the Beeb. An excellent 'terminal' program which allows the machine to be used with a variety of modems is provided, along with a series of telephone numbers for 'bulletin boards' and a buyers guide to modems.

Prices on the modems are, unfortunately, somewhat out of date – and some of the companies listed have gone out of business. But it is encouraging that the authors have tried to develop something approaching a comprehensive guide to comms with the Beeb.

The other great thing about this book is that it is 'machine-specific'. Unlike most other books on comms – which leave it to you to write or buy software for your Beeb *and* find, buy and hook-up a suitable modem – this guide does actually take the facilities and needs of your machine into account.

The Hacker's Handbook
Publisher: Longman
Softback – 128pp
Price: £4.95

At last an answer to the bored micro blues. Having leaned the many useless things a home computer can do, you can now make the hours of concentration pay. No longer will you be beaten at every game, or continue those records of defunct stamp collections. Clive Prigmore has the solution in 30 Hour Useful Home Computing.

As the sequel to his first book, 30 Hour Basic which has sold over 150,000 copies, Useful Home Computing is designed to take the enthusiast into areas where, dare I say it, work is involved.

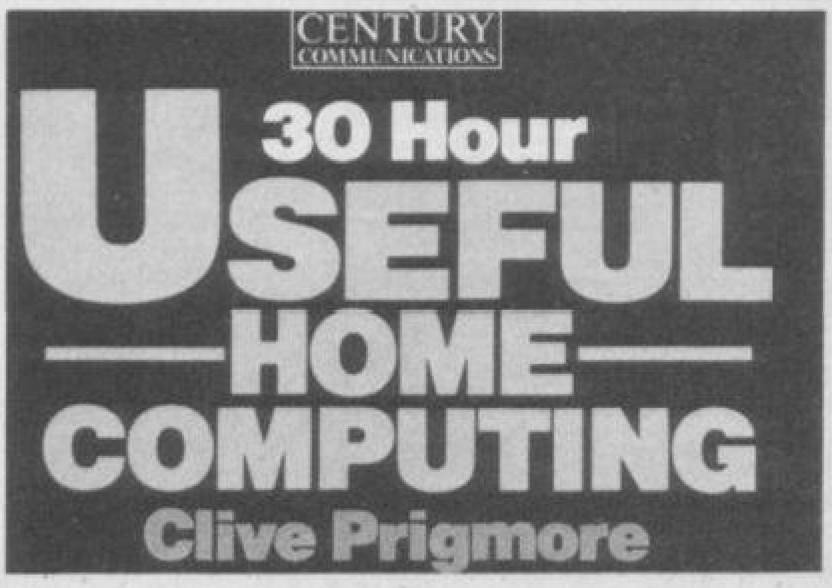
Most home computers are bought for purposes other than games playing alone, yet many owners never get further than Pacman and when they do it's only into the seat of a flight simulator. The thought of buying word processors, disc drives and a printer is daunting and expensive, particularly if you are unsure of their usefulness to you.

The book demonstrates the serious uses of the home computer, particularly directed towards small businesses, clubs, shops and societies. Using a number of excellent diagrams the book covers the basic hardware requirements and its respective applications – Word Processing, Data processing and Spreadsheets – indicating which software would be most appropriate for you and your machine.

Concentrating on the BBC micro, Sinclair QL, Amstrad and Commodore 64, the book will prove useful to anyone with serious intentions for their micro. Each chapter ends with a few questions to check your understanding of the book, and although it is not dedicated to one micro, it has time to cover such details as pressure pad input devices, bar codes and digital tracers.

While Clive Prigmore's second book may not have such a readership as the first, any home computer owner with a redundant or seldom used micro will find this book an inspiration, if only in its revelation of the possibilities open to you.

30 Hour Useful Home Computing
Publisher: Century Communications
Softback – 182pp
Price: £8.95



TURTLE

◆ *Spectrum* ● *P. Pinder* ● *London*

Driving a turtle is a little like giving someone road directions – go so many yards, then turn right, go on again, then turn left, and so on. That is not at all easy to do in Basic, which lays out its screen like a map and much prefers movement to be in the orienteering style of "go from 094/453 to 122/474".

Very few home computers have a built-in GO RIGHT, GO LEFT instruction mode – the enterprise is the only Basic I know which has it – and so driving a turtle is not easy unless you can afford to buy a separate Logo language package.

This program can drive a screen turtle and, using a suitable interface, it is also possible to drive a simple two-motor floor buggy. The set-up I used was a Centronics relay board from Cirkit plugged into a dK'tronics Centronics printer interface. That allows a motor to be turned on by the simple command LPRINT CHR$(1); and turned off again by LPRINT CHR$(0); Other hardware add-ons might require an OUT addr,x to switch something on and OUT addr,y to switch it off.

If you add your own motor-control code, remember the format is MOTOR ON, DELAY, MOTOR OFF. As it stands, the program moves a turtle over the screen. The commands to drive a floor buggy should be patched in at lines 503, 553, 602 and 604 according to what piece of hardware is on the back of your Spectrum.

Spectrum Basic calculates angles in radians rather than in degrees but apart from that complication, the code for moving Right, Forward and Left is short and occupies three short subroutines. A time delay is the fourth subroutine.

```
100 REM LOGO TURTLE
105 REM SPECTRUM
132 LET Q=6: REM Q=1
133 LET D=1: REM D=6
134 LET T=0: LET AA=0
140 PLOT 128,84
150 GOSUB 200
152 :
154 REM INPUT LOOP
160 INPUT B$: IF B$="0" THEN   STOP
170 GOSUB 300: GO TO 160
180 :
200 REM READ COMMAND TABLE INTO
201 REM ARRAYS A$ & A
202 RESTORE 250: READ COM
204 DIM A$(COM): DIM A(COM)
206 FOR N=1 TO COM: READ A$(N): READ A(N): NEXT N
207 RETURN
250 DATA 3,"R",500,"L",550,"F",600
298 :
299 REM PROCESS INPUT STRING
300 IF B$="" THEN RETURN
310 LET N=1
320 IF B$(1)=A$(N) THEN  GO TO 350
330 LET N=N+1: IF N>COM THEN  RETURN
340 GO TO 320
350 LET B$=B$(2 TO ): LET K=1
360 IF B$(K)<"0" OR B$(K)>"9" THEN  GO TO 390
370 LET K=K+1: IF K>LEN B$ THEN  GO TO 390
380 GO TO 360
390 LET V=VAL (B$(1 TO K-1))
400 LET B$=B$(K TO )
410 GO TO A(N)
420 :
499 REM GO RIGHT
500 LET V=V*D: LET V=T+V
501 IF V>359 THEN LET V=V-360
502 LET T=V: LET AA=V/(Q*30)*PI
503 REM CODE FOR LEFT MOTOR
504 GO TO 300
506 :
549 REM GO LEFT
550 LET V=V*D: LET V=T-V
551 IF V<0 THEN  LET V=ABS V: LET V=360-V
552 LET T=V: LET AA/(Q*30)*PI
553 REM CODE FOR RIGHT MOTOR
554 GO TO 300
555 :
559 REM GO FORWARD
600 LET NX=V*SIN AA: LET NY=V*COS AA: DRAW NX,NY
602 REM CODE FOR LEFT MOTOR
604 REM CODE FOR RIGHT MOTOR
622 GO TO 300
624 :
899 REM DELAY FOR V*0.1sec
900 FOR J=0 TO V
902 FOR R=1 TO 10: NEXT R
904 NEXT J
906 RETURN
908 :
```

Body language

The main body of the program – lines 100-410 – accepts and processes the input commands. Those commands may be given in the individual form of Ldd, Rdd or Fpp, where dd=degrees and pp=pixels, or as a multiple input line such as F5L90F50L5F44. The instructions will be obeyed one after another in sequence. Entering a nought instead of a letter will take you back to Basic.

The advantage of this system is the ease with which extra commands can be added to the program. Line 250 holds the number of commands available – three in this case – followed by the command letter and the line at which the routine serving that command is to be found.

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted to Your computer exclusively.

WOKSTIX

◆ BBC ● N. Clarke ● Oxford

```
LIST
 100 REM random sharps
 102 ENVELOPE 3,7,2,1,1,1,1,1,121,-10,-5,-2,40,0
 110 D1=10:D2=10:D3=3
 120 V1=-10:V2=-5:V3=0
 130 T=15:Q=5:DIM B(25)
 140 RESTORE 150
 150 DATA 17,29,37,45
 160 DATA 57,65,77,85,93
 170 DATA 105,113,125,133,141
 180 DATA 153,161,173,181,189
 190 DATA 201,209,221,229,237,249
 200 REM load array with notes
 210 FOR N=1 TO 25
 220   READ B(N)
 230   NEXT N
 240 N=RND(T)
 250 IF RND(100)<50 THEN GOTO 410
 260 REM up-scale
 270 S=RND(Q):Z=1
 290 IF RND(100)>80 THEN GOTO 240
 300 FOR X=1 TO S
 310   A=1:L=1:M=1
 320   IF RND(100)>80 THEN A=1.5
 330   SOUND &0201,V1,B(N),D1*A
 340   IF RND(100)<66 THEN L=0
 350   SOUND &0202,V2*L,B(N+3),D2*A
 352   REM IF RND(100)<80 THEN M=0
 354   SOUND &0203,V3,B(N),D3
 360   N=N+1:IF N=T+1 THEN X=S:Z=0:N=N-1
 370   NEXT X
 380 IF Z=0 THEN GOTO 410
 390 GOTO 250
 400 REM down the scale
 410 S=RND(Q):Z=1
 420 IF RND(100)>80 THEN GOTO 240
 430 FOR X=1 TO S
 440   A=1:L=1:M=1
 450   IF RND(100)>80 THEN A=2
 460   SOUND &0201,V1,B(N),D1*A
 470   IF RND(100)<66 THEN L=0
 480   SOUND &0202,V2*L,B(N+2),D2*A
 482   REM IF RND(100)<75 THEN M=0
 484   SOUND &0203,V3,B(N),D3
 490   N=N-1:IF N=0 THEN X=S:Z=0:N=N+1
 500   NEXT X
 510 IF Z=0 THEN GOTO 270
 520 GOTO 250
```



This program is an adaptation of the oriental rendering of the same name, presented some issues ago for the Enterprise computer. For the uninitiated, the computer is set to play, randomly, the black notes of the musical scales, on the grounds that the results are slightly more musical than a dawn chorus of tomcats.

For those unfamiliar with the BBC sound commands, a few notes will not be amiss. The main SOUND command is line 330, in the up-scale loop, and its identical twin in the down-scale loop is line 460. The BBC sound statement takes the form:

SOUND control,
amplitude OR
envelope number,
pitch,
duration

and in the program a typical line is:

330 SOUND &0201,V1,B(N),D1*A

The lost chord

CONTROL: The first of the four digits is zero, indicating that new notes have precedence over old; in other words the old note is cut short by the new note. The second digit, a 2, indicates that the sound can begin only when information from two other channels has been received. This information will be delivered by subsequent program lines. The third digit must be zero; a 1 will affect the sound adversely on the other channels. The fourth and final digit identifies which of the three sound channels is being used by the statement.

AMPLITUDE: negative numbers represent volume, –15 is loudest. A positive number 1, 2 or 3 indicates that an envelope, specified elsewhere in the program, is being applied to this particular sound channel.

PITCH: The pitch of the note is given by B(N) and is one of the values extracted from the pitch table in DATA lines 150-190. The program is not set to use the high-sounding notes on DATA line 190, though they could be used if RESTORE 150 were to be changed to RESTORE 160. The high pitch values in DATA line 180 are used in association with a simple chord mechanism.

DURATION: The duration of the note is set to various values in line 110; for example, D1 at 10 is loud enough for the melody notes on channel one. The duration is modified later in the SOUND statement by multiplying it by A, where A is randomly set to 1, 1.5, or 2.

The chord note is sounded by the second sound channel – see lines 350 and 480. Those lines make available a note which is two or three sharps higher than the melody note, thus providing the means of forming a simple chord. That, however, is not sounded on every note but only on occasions which are determined by the random factor of the preceding lines 340 and 470. When a chord is not required – which, in this program, is 65 percent of the time – L is set to zero rather than 1 and the chord-note is thus turned off.

The third channel is used for experiments with envelopes. Envelope 3 is set up in line 102. V3, the volume variable for channel three, is set to 3 to indicate that the channel is subject to whatever volume the envelope imposes on it. The envelope shape is complicated to set up – consult the BBC handbook if you want to alter it. If the volume is not to your liking, it can be adjusted by altering the last two numbers shown in line 102.

File

SKYBLAST

◆ *Commodore 64* ● *S. Roy*
● *Perivale*

Your bomber plane has run out of fuel. The pilot attempts to land the plane by flying in a circle, but as the plane gets lower and lower, you see below you a city with many sky scrapers.

Your only chance of landing safely depends on dropping bombs on the buildings, levelling them to the ground.

There is one control : SPACE to drop a bomb.

Good luck. You'll need it!!

```
100 FORT=0TO24:POKE54272+T,0:NEXT
101 POKE54296,5:POKE54277,33:POKE54278,255:POKE54276,17
102 GOSUB156
103 POKE15584,50:L%=1
104 POKE53281,1:POKE53280,1:POKE2040,227:POKE2041,228:POKE2042,229
105 POKE2043,230:FORI=0TO15:POKEI+53248,0:NEXT
106 POKE2044,231:POKE2045,232:POKE2046,227:POKE2047,233
107 POKE680,60:POKE682,60:POKE684,60:POKE686,100:POKE688,100
108 POKE690,100:POKE692,100:POKE694,100
109 POKE53277,255:POKE53271,255:POKE53287,0:POKE53289,0:POKE53288,6
110 POKE53290,0:POKE53291,2:POKE53292,6:POKE53293,2:POKE53294,0:POKE53269,255
111 GOSUB323
112 POKE679,118:POKE681,146:POKE683,174
113 POKE685,90:POKE687,118:POKE689,146:POKE691,174:POKE693,202
114 SYS15059:IFPEEK(197)=4THEN121
115 IFPEEK(186)=1THEN114
116 POKE679,174:POKE681,146:POKE683,118
117 POKE685,202:POKE687,174:POKE689,146:POKE691,118:POKE693,90
118 SYS15059:IFPEEK(197)=4THEN121
119 IFPEEK(186)=1THEN118
120 GOTO112
121 POKE53281,12:PRINTCHR$(147);:POKE53281,1
122 POKE53277,1:POKE53271,0:POKE2040,224:POKE2041,226
123 POKE53248,150:POKE53250,162:POKE53249,70:POKE53251,70
124 POKE53287,0:POKE53288,0:POKE53269,1
125 FORX=0TO39:A=1944+X
126 Y=INT(RND(1)*6):FORI=0TOY
127 A=(1944+X)-(I*40):POKEA,0:NEXT:POKEA,81:NEXT
128 IFK=0THENPRINTCHR$(19)"▯YOUR SCORE  :  ■000000"
129 IFK=1THENPRINTCHR$(19)"▯YOUR SCORE  :  ■";A$
130 PRINTCHR$(19)TAB(26)"■LEVEL ■";L%
131 POKE54284,33:POKE54285,255:POKE54280,120:POKE54296,10:POKE765,0:POKE767,0
132 POKE54277,33:POKE54278,255:POKE54276,17:POKE54283,129:POKE53265,27
133 POKE56334,0:POKE766,0:SYS15100:POKE53274,240
134 POKE56333,127:POKE788,49:POKE789,234:POKE53265,27:POKE56333,129
135 POKE56334,1
136 IFPEEK(766)=2THEN148
137 A$="":FORI=0TO6:A=PEEK(I+1037):IFA<27THENA=A+64
138 A$=A$+CHR$(A):NEXT:K=1
139 S=PEEK(15584)-3:IFS<1THENS=1
140 POKE15584,S
141 FORT=0TO24:POKE54272+T,0:NEXT:POKE54296,10:POKE54277,33:POKE54278,255
142 POKE54276,65:POKE54275,200:POKE53269,0
143 FORI=-30TO30:POKE646,ABS(I):POKE54273,ABS(I*4)
144 PRINT"   WELL DONE...YOU LANDED SAFELY !!!"
145 NEXT:L%=L%+1
146 POKE54276,129:FORI=0TO10:POKE54296,I:FORJ=0TO400:NEXTJ,I:GOTO121
147 GOTO121
148 POKE2040,225:POKE53269,1:POKE54276,0:POKE53283,0:POKE53273,30:POKE54280,30
149 POKE54276,129:POKE54283,129:POKE54296,15
150 FORI=0TO7:POKE53270,I:NEXT:FORI=7TO0STEP-1:POKE53270,I:NEXT
151 POKE54276,128:POKE54283,128
152 FORJ=0TO4
153 FORI=0TO7:POKE53270,I:NEXT:FORI=7TO0STEP-1:POKE53270,I:NEXTI,J
154 FORT=0TO24:POKE54272+T,0:NEXT:POKE53269,0:POKE53270,200

155 FORT=0TO2000:NEXT:GOTO335
156 DATA0,0,0,0,0,0,0,0
157 DATA0,224,0,0,176,0,0,184
158 DATA0,0,191,255,224,59,109,216
159 DATA255,255,238,241,224,242,238,223
160 DATA126,253,254,248,255,253,224,0
161 DATA250,0,1,244,0,3,232,0
162 DATA7,240,0,0,0,0,0,0
163 DATA0,0,0,0,0,0,0,254
164 DATA0,0,0,0,8,128,2,0
165 DATA8,0,1,0,225,144,80,224
166 DATA17,8,240,2,2,255,224,16
167 DATA237,176,8,255,248,40,255,252
168 DATA194,0,246,0,35,251,0,1
169 DATA255,136,0,252,196,8,126,192
170 DATA64,63,196,1,3,128,0,0
171 DATA9,16,128,0,0,0,0,0
172 DATA0,0,0,0,0,0,0,0
173 DATA0,0,0,0,0,0,0,1
174 DATA240,0,0,224,0,0,64,0
175 DATA0,224,0,1,240,0,1,240
176 DATA0,1,240,0,1,240,0,1
177 DATA240,0,0,224,0,0,64,0
178 DATA0,0,0,0,0,0,0,0
179 DATA0,0,0,0,0,0,0,9
180 DATA0,0,0,0,124,0,0,254
181 DATA0,1,255,0,1,199,0,1
182 DATA199,0,1,192,0,1,192,0
183 DATA0,252,0,0,126,0,0,7
184 DATA0,0,7,0,1,199,0,1
185 DATA199,0,1,255,0,0,254,0
186 DATA0,124,0,0,0,0,0,0
187 DATA0,0,0,0,0,0,0,255
188 DATA0,0,0,1,199,0,1,199
189 DATA0,1,207,0,1,223,0,1
190 DATA254,0,1,252,0,1,248,0
191 DATA1,240,0,1,240,0,1,240
192 DATA0,1,248,0,1,252,0,1
193 DATA222,0,1,207,0,1,199,0
194 DATA1,199,0,0,0,0,0,0
195 DATA0,0,0,0,0,0,0,255
196 DATA0,0,0,1,199,0,1,199
197 DATA0,1,199,0,1,199,0,1
198 DATA199,0,1,239,0,0,254,0
199 DATA0,124,0,0,56,0,0,56
200 DATA0,0,56,0,0,56,0,0
```

```
201 DATA56,0,0,56,0,0,56,0
202 DATA0,56,0,0,0,0,0,0
203 DATA0,0,0,0,0,0,0,0
204 DATA0,0,0,1,252,0,1,254
205 DATA0,1,255,0,1,207,0,1
206 DATA199,0,1,199,0,1,206,0
207 DATA1,252,0,1,252,0,1,206
208 DATA0,1,199,0,1,199,0,1
209 DATA207,0,1,255,0,1,254,0
210 DATA1,252,0,0,0,0,0,0
211 DATA0,0,0,0,0,0,0,1
212 DATA0,0,0,1,192,0,1,192
213 DATA0,1,192,0,1,192,0,1
214 DATA192,0,1,192,0,1,192,0
215 DATA1,192,0,1,192,0,1,192
216 DATA0,1,192,0,1,192,0,1
217 DATA192,0,1,255,0,1,255,0
218 DATA1,255,0,0,0,0,0,0
219 DATA0,0,0,0,0,0,0,255
220 DATA0,0,0,0,124,0,0,254
221 DATA0,1,255,0,1,199,0,1
222 DATA199,0,1,199,0,1,199,0
223 DATA1,255,0,1,255,0,1,199
224 DATA0,1,199,0,1,199,0,1
225 DATA199,0,1,199,0,1,199,0
226 DATA1,199,0,0,0,0,0,0
227 DATA0,0,0,0,0,0,0,255
228 DATA0,0,0,1,255,0,1,255
229 DATA0,1,255,0,0,56,0,0
230 DATA56,0,0,56,0,0,56,0
231 DATA0,56,0,0,56,0,0,56
232 DATA0,0,56,0,0,56,0,0
233 DATA56,0,0,56,0,0,56,0
234 DATA0,56,0,0,0,0,0,0
235 DATA0,0,0,0,0,0,0,0
236 DATA169,0,133,251,133,253,141,14
237 DATA220,169,51,133,1,169,208,133
238 DATA252,169,48,133,254,160,0,177
239 DATA251,145,253,136,208,249,230,252
240 DATA230,254,165,254,201,56,208,240
241 DATA169,55,133,1,169,1,141,14
242 DATA220,162,8,189,194,58,157,255
243 DATA47,189,202,58,157,135,50,202
244 DATA208,241,96,254,146,254,146,254
245 DATA146,254,146,16,16,56,84,254
246 DATA146,254,146,169,0,133,186,162
247 DATA16,189,255,207,221,166,2,240
248 DATA11,176,6,254,255,207,76,236
249 DATA58,222,255,207,189,255,207,221
250 DATA166,2,240,4,169,1,133,186
251 DATA202,208,222,96,169,27,141,17
252 DATA208,169,8,141,253,2,169,0
253 DATA141,254,2,173,31,208,120,169
254 DATA127,141,13,220,169,55,141,20
255 DATA3,169,60,141,21,3,169,125
256 DATA141,18,208,169,129,141,13,220
257 DATA141,26,208,88,173,255,2,208
258 DATA22,165,2,201,239,208,16,173
259 DATA1,208,141,3,208,169,3,141
260 DATA21,208,169,1,141,255,2,173
261 DATA3,208,201,244,144,13,169,0
262 DATA141,1,212,141,255,2,169,1
263 DATA141,21,208,32,15,61,201,229
264 DATA144,6,169,1,141,254,2,96
265 DATA173,31,208,141,255,7,41,1
266 DATA240,6,169,2,141,254,2,96
267 DATA173,255,7,41,2,240,173,169
268 DATA1,141,21,208,169,0,141,255
269 DATA2,141,1,212,169,170,133,251
270 DATA169,7,133,252,160,0,177,251
271 DATA240,14,201,81,208,142,169,32
272 DATA145,251,32,203,59,76,44,59
273 DATA56,165,251,233,40,133,251,176
274 DATA2,198,252,160,0,177,251,201
275 DATA81,208,237,169,32,145,251,160
276 DATA40,169,81,145,251,32,203,59
277 DATA76,44,59,162,50,173,18,4
278 DATA201,57,240,7,238,18,4,202
279 DATA208,243,96,169,48,141,18,4
280 DATA173,17,4,201,57,240,6,238
281 DATA17,4,76,215,59,169,48,141
282 DATA17,4,173,16,4,201,57,240
283 DATA6,238,16,4,76,215,59,169
284 DATA48,141,16,4,173,15,4,201
285 DATA57,240,6,238,15,4,76,215
286 DATA59,169,48,141,15,4,173,14
287 DATA4,201,57,240,6,238,14,4
288 DATA76,215,59,169,48,141,14,4
289 DATA173,13,4,201,57,208,5,169
290 DATA48,141,13,4,76,215,59,173
291 DATA25,208,41,1,208,3,76,49
292 DATA234,141,25,208,173,18,208,16
293 DATA13,169,7,76,236,60,169,125
294 DATA141,18,208,76,188,254,32,1
295 DATA61,173,253,2,201,255,240,6
296 DATA141,22,208,76,201,60,169,7
297 DATA141,253,2,141,22,208,173,168
298 DATA6,141,207,6,173,208,6,141
299 DATA247,6,173,248,6,141,31,7
300 DATA173,32,7,141,71,7,173,72
301 DATA7,141,111,7,173,112,7,141
302 DATA151,7,173,152,7,141,191,7
303 DATA162,1,189,168,6,157,167,6
304 DATA189,208,6,157,207,6,189,248
280 DATA6,157,247,6,189,32,7,157
306 DATA31,7,189,72,7,157,71,7
307 DATA189,112,7,157,111,7,189,152
308 DATA7,157,151,7,232,224,40,208
309 DATA209,173,255,2,240,9,238,3
310 DATA208,173,3,208,32,24,61,206
311 DATA238,2,208,8,238,1,208,169
312 DATA60,141,238,2,169,241,141,18
313 DATA208,76,188,254,141,22,208
314 DATA169,0,141,32,208,169,60,141,18,
    208,169,0,141,33,208,76,188,254
315 DATA169,1,141,33,208,169,1,141,32,
    208,206,253,2,96
316 DATA173,1,220,133,2,173,1,208,96
317 DATA169,255,56,237,3,208,141,1,
    212,96,-1

318 POKE53280,14:POKE53281,6
319 PRINTCHR$(147)"[illegible]          PLEASE WAIT...SETTING UP CODE"
320 READA:IFA<>-1THENPOKE14336+I,A:I=I+1:T=T+A:POKE54273,A:GOTO320
321 IFT<>118306THENPRINT"CODE ERROR !":PRINT"LINES 156-317":POKE54296,0:END
322 S2$=CHR$(31)+"CBM "+CHR$(28)+"002000":H=2000:GOTO353
323 REM *** TITLE TEXT ***
324 PRINTCHR$(147):FORI=1TO8:PRINT:NEXT:PRINTTAB(27)CHR$(31)"BY SUMAN ROY"
325 PRINTCHR$(154):PRINT"YOUR BOMBER PLANE HAS RUN OUT OF FUEL !"
326 PRINTCHR$(150)"AS THE PILOT STRUGGLES TO KEEP THE "
327 PRINT"PLANE ON A SMOOTH DESCENT PATH,YOU"
328 PRINT"NOTICE THE BUILDINGS IN THE CITY BELOW."
329 PRINT"YOUR ONLY CHANCE IS TO DROP BOMBS ON"
330 PRINT"THE BUILDINGS,ALLOWING THE PLANE TO"
331 PRINT"                    LAND."
332 PRINTCHR$(144):PRINT"   PRESS THE SPACE BAR TO DROP A BOMB."
333 PRINT:PRINTTAB(11)CHR$(154)"PRESS 'F1' TO PLAY"
334 K=0:PRINTCHR$(19)TAB(10)CHR$(154)"HI-SCORE  ";S2$:RETURN
335 S1$="":A$="":S$=A$:FORI=1TO6:A=PEEK(I+1036):IFA<26THENA=A+64
336 A$=CHR$(A):S$=S$+A$:NEXT
337 S=VAL(S$):IFS<=HTHEN104
338 H=S:A=0
339 PRINTCHR$(147);:FORI=1TO13:PRINT:NEXT:POKE53280,1:POKE53281,1
340 POKE53269,1:POKE53271,0:POKE53277,1:POKE2040,224:POKE53248,0:POKE53249,150
341 FORI=0TO150:POKE53248,I:NEXT:PRINTCHR$(144)TAB(18)"..."
342 FORI=151TO255:POKE53248,I:NEXT:POKE53264,1:FORI=0TO99:POKE53248,I:NEXT
```

(continued on page 74

(continued from page 91)

```
343 POKE53269,0:POKE53248,0:POKE53264,0
344 PRINTCHR$(19):FORI=1TO8:PRINT:NEXT:PRINTTAB(5)CHR$(154);
345 PRINT"YOU HAVE THE NEW HIGH SCORE !!"CHR$(28)
346 PRINT:PRINTTAB(7)"PLEASE ENTER YOUR INITIALS"
347 PRINT:PRINTTAB(18);:C=0
348 POKE204,0:GETA$:IFA$>="A"ANDA$<="Z"THEN350
349 GOTO348
350 PRINTA$;:S1$=S1$+A$:C=C+1:IFC<3THEN348
351 S2$=CHR$(31)+S1$+" "+CHR$(28)+S$
352 POKE204,1:PRINTCHR$(147);:GOTO103
353 I=0:T=0
354 SYS14976:POKE53272,28
355 PRINTTAB(12)"SETTING UP UDG'S"
356 PRINT"          ABCDEFGHIJKLMNOPQRSTUVWXYZ"
357 READA:IFA<>-1THENPOKE12296+I,A:I=I+1:T=T+A:POKE54273,A:GOTO357
358 IFT<>27448THENPRINT"GRAPHICS ERROR !":PRINT"LINES 362-387":K=1
359 IFK=1THENPOKE54296,0:END
360 POKE54296,0
361 RETURN
362 DATA126,102,102,254,230,230,230,0
363 DATA126,102,102,248,230,230,254,0
364 DATA126,102,96,224,224,230,254,0
365 DATA120,108,102,230,230,230,254,0
366 DATA126,102,96,248,224,230,254,0
367 DATA126,102,96,248,224,224,224,0
368 DATA126,102,96,238,230,230,254,0
369 DATA102,102,102,254,230,230,230,0
370 DATA24,24,24,56,56,56,56,0
371 DATA12,12,12,14,14,78,126,0
372 DATA108,108,108,254,230,230,230,0
373 DATA96,96,96,224,224,226,254,0
374 DATA99,127,107,235,227,227,227,0
375 DATA102,102,118,254,238,230,230,0
376 DATA126,102,102,230,230,230,254,0
377 DATA126,102,102,254,224,224,224,0
378 DATA126,102,102,230,230,238,254,4
379 DATA126,102,102,254,236,230,230,0
380 DATA126,102,96,127,7,103,127,0
381 DATA126,24,24,56,56,56,56,0
382 DATA102,102,102,230,230,230,254,0
383 DATA102,102,230,230,230,60,24,0
384 DATA99,99,99,235,235,255,227,0
385 DATA102,102,60,24,60,230,230,0
386 DATA102,102,102,126,24,24,24,0
387 DATA126,70,12,24,48,226,254,0,-1
388 REM ****************
389 REM *** SKYBLAST ***
390 REM ***          ***
391 REM ***(C)  S.ROY***
```

PARTIAL-SCREEN SAVE

◆ *Amstrad* ● *David Norman* ● *Manchester*

The 16K Amstrad screen occuypies a good deal of space in RAM, on tape and on disc, so it would seem sensible to be able to save small portions instead of having to save the entire block of video-RAM, which runs from &C000 to &FFFF.

The routines presented here are in machine code and they may be CALLed from Basic or converted into Locomotive-Basic RSX commands. To save part of the screen, use the command CALL &9014,XL,XH,YH,YL where XL is the low X co-ordinate, XH the high X co-ordinate,m YH the high Y co-ordinate and YL the low Y co-ordinate. To recall the screen segment use CALL &9010 on its own.

Because those screen-moving routines work on the screen co-ordinate number – 0-639 and 0-199 – they are impervious to the screen-scrolling action which muddles the screen addresses. That means that the saved screen segment always returns to its correct position on the screen, even though the screen may have undergone drastic changes.

The screen portions are saved in user-RAM between &8000 and &9000. That is a 4K area, so portions as big as one-quarter of the screen may be saved there. The machine code does not check the co-ordinates supplied to it to see whether they represent a quarter screen or less. If you want to incorporate such checks, which might be advisable, you should do so in Basic before &9014 is called. The instructions to save and recall the screens from tape/disc are:

Saving: CALL &9014,XL,XH,YH,YL:SAVE "NAME.BIN",B,&8000,&1008

Recall: LOAD "NAME.BIN":CALL &9010

For economical folk who want to save only very small pictures taking up no more than one-sixteenth of the screen, there are simple changes which can be made to the code to permit it. The high-memory pointer can be bumped up by 3K using the command MEMORY &8BFF – that is 3K more space for Basic programs – and the POKE in the loading program will need changing from POKE &9001,&80 to POKE &9001,&8C. The save-to-tape/disc instruction also needs changing to SAVE "NAME.BIN",B,&8C00,&408 but everything else stays the same. The listing presented is for the quarter-screen version and it loads and saves the machine code bytes in one operation.

Listing 1.

```
100 MEMORY &7FFF
110 RESTORE 160
120 FOR a=&9010 TO &9087
130 READ A$:POKE A,VAL("&"+A$):NEXT
140 POKE &9000,0:POKE &9001,&80
150 SAVE "SCR.BIN",B,&9000,&89:STOP
160 DATA 0E,01,18,14,0E,00,06,08,21,02,90
170 DATA DD,7E,00,77,DD,23,23,10,F7,CD,11
180 DATA BC,47,3A,00,90,6F,3A,01,90,67,E5
190 DATA DD,E1,3A,08,90,5F,3A,09,90,57,3A
200 DATA 07,90,92,D8,20,05,3A,06,90,93,D8
210 DATA 3A,04,90,6F,3A,05,90,67,E5,C5,D5
220 DATA CD,1D,BC,D1,C1,CB,41,28,06,DD,7E
230 DATA 00,77,18,04,7E,DD,77,00,DD,23,E1
240 DATA 2B,3A,03,90,BC,20,E0,3A,02,90,BD
250 DATA 20,DA,78,13,FE,00,28,C0,13,13,13
260 DATA FE,01,28,B9,13,13,13,13,18,B3
```

Spectrum 128



In an exclusive preview Lee Paddon gets to grips with the long awaited Sinclair RSK Spectrum.

It is now almost four years since the Spectrum burst on to the British computer scene. The unlovely beast, with a "dead flesh" keyboard, quirky Basic and indifferent performance has transformed the computer scene. Two million sales later, it has made Britain the most computer-literate country on earth and has been the best-seller from the day it was released.

Whichever way you look at the machine, as the boon or the bane of the British computer scene, giving it a facelift must be one of the most important events of the year. After a previous merely cosmetic attempt to give the machine a new lease of life with the Spectrum Plus, Sinclair has clearly decided it is time to deal with at least a few of the bones of contention concerning the original machine. With the cost of components continuing to plummet, the company should be able to offer much more computing power for your money.

The first thing you notice about the new machine is how little it has changed. The case is identical, even down to the now redundant holes for the internal speaker. It has, however, sprouted a heat sink on one side.

A quick glance round the base of the case reveals a few more changes. The ear and mike sockets have moved to the left of the case and are joined there by a QL-style RS232 telephone socket. As well as printing-out programs using a QL compatible printer lead, that port also doubles as a musical instrument digital interface. Yet another adapter lead is available to allow it to plug into standard Midi equipment. A monitor socket has replaced the mike/ear socket at the rear of the case. Another telephone socket for the numeric keypad graces the front of the base. The keypad is not part of the basic package as it is in Spain.

Good news – bad news

Taking off the top, you realise that the changes are far from cosmetic. What you find is a completely re-designed circuit board which now fills the entire case. At the extreme right, strapped to the heat sink, is the regulator. The old heat sink which used to overlay the top of the PCB has disappeared, along with the internal speaker, which is replaced by the perennial General Instruments AY-3-8912 – all sound is now through the TV.

The new Ferranti ULA now stretches almost the entire width of the board. The 128K memory consists of 16 8K RAM chips. In the review copy they were a mixture of 5162s and 5222s. There is a new version of the Sinclair ROM and an extra 32K ROM next to the Z-8400A chip, a CMOS version of the old Z-80A. The monitor socket takes a Sinclair-style RGB monitor.

Whereas the old circuit board had evolved gradually through four versions, Sinclair has obviously taken the latest facelift as an opportunity to start more or less from scratch. Two trimming pots make an appearance, the power supply is re-designed to cope with the increased demands, and generally the board has a cleaner appearance. It seems likely that the model might have a better reliability record than previous incarnations.

Still, it is not our practice to give unstinting praise so, after the bouquets for good design, the brickbats for what might have been there. Surely after four years we might be spared another plastic membrane keyboard. Whatever Sinclair enthusiasts might say, it is no substitute for a real full-travel keyboard. The cost of such a change would have been negligible, although it would have required re-tooling the production line.

The insistence on Sinclair's own design smacks of eccentricity. For a machine which claims to be the premier games computer, the lack of a joystick port – or two – really is astonishing. The Sinclair joystick standard is now supported by virtually all games producers, so it would have made sense to include a twin port of that type. Perhaps a Microdrive interface would be asking too much but, having put its faith in them it would have helped establish the new machine as something more than just a toy.

Surely most people would happily have traded the space occupied by the extra 64K of memory for some or all of those extras. Well, at least the add-on makers can breathe a sigh or relief and get on with business as usual; new owners will still to be faced with the hidden bill for the extra items they need to do something interesting with it.

Another famous flaw is the load/save procedure. If you want to store a program, you must first disconnect the ear socket. Thus, by the time you have saved and verified a program, you have spent a good deal of time fiddling with the leads. Surely the inclusion of the odd diode to clear up that difficulty was not beyond the re-design budget?

When asked by Jools Holland on a memorable edition of "The Tube" what he looked for most is an "Air Guitarist", Lemmy replied, with remarkable astuteness, "a guitar". So it is with the Spectrum 128. What you look for most in the new machine is a Spectrum Plus. Standing on its merits, this machine would be asphyxiated in the astringent atmosphere of today's market. Its sole recommendation is its ability to run the library of roughly 5,000 titles available for its older brother.

Compatibility is one of those terms which is sprinkled like confetti in press releases and publicity material. If words were currency, this one has undergone more frequent devaluations at the hands of computer manufacturers than any other.

A good sign is when you open the box. There is the old familiar Spectrum Plus manual of 80 pages next to a slim 14-page booklet on the Spectrum 128 – surely nothing much has changed? Appearances, however, can be deceiving. The disproportionate length is due to the paucity of the manual rather than the lack of change. There is no mistaking the difference, right from power up. No more coy copyright message but instead a menu. For a moment, the unwary might assume that Sinclair has become a bit of a WIMP and has jumped on to the user-friendly bandwagon. There are five choices – Tape Loader, 128 Basic, Calculator, 48 Basic and Tape Tester.

Familiar ground

Using the cursor and enter keys, if you select the 48K option you are soon on solid, familiar ground. The screen re-sets, the familiar copyright message appears, and away you go. All programs and add-ons we tried appeared to perform normally and the manual claims that any Basic program should work so long as it avoids poking too many system variables. No clue is given, however, about which system variables are affected or what you should do to try to correct the problem.

So, although it is a rather bizarre way of looking at a new machine, it appears to work at least as well as its cheaper predecessor. The first choice on the

continued on page 76

Spectrum 128

continued from page 75

menu, Tape Loader, will start the loading of 128K software. So if you want only to play games, the only thing you ever need to do with the machine is power-up, hit return and set the tape rolling. Although meant for 128K-type programs only, it appeared to work with most 48K programs which were tried.

The Tape Tester is to help set the volume level for playing back programs. After selecting that option, a bar appears, you play a section of a program tape and adjust the volume to get a small block as far to the right on the scale as possible. Hours of innocent fun can be had this way.

There is also a colour test. Re-setting the machine with the "break" key down displays a series of vertical bands in the eight paper colours, bright and normal, with the eight ink colours displayed on them. That allows you to tune your set and adjust the colour, contrast and brightness controls to obtain the best picture.

The calculator allows you to perform simple caluclations using the four operators +,−,* and / as well as brackets. You can use that from 128K mode and return again to your program, so it has some use for calculating offset addresses and screen displays.

128 enhancements

Last, there is 128 mode. It is radically different from the old Spectrum, more what we are used to from other firms. Out is single keystroke entry, in is a full screen editor and the new keywords to control the new sound chip. On starting-up, the blue cursor appears in the top left corner. Letters and numbers appear just as they are entered from the keyboard. On pressing the enter key, the line is checked for syntax. If it is a program line, it is shifted one column to the right, all the keywords are changed to upper-case, and the cursor moves either down a line with a contented beep or flashes at the part of the line with which it is having difficulty.

If the program is run, any result is printed on the main screen and any errors are reported in the status line at the bottom. Then, as soon as any key is pressed, the program listing re-appears with the cursor at the last line which was edited. That makes it simple to edit repeatedly and run a program and get back quickly to the line you just changed.

To move round the listing, you use the cursor keys. The listing can scroll in either direction, lines can be entered in any order, and can be over-written or deleted. Single keywords might have been useful to beginners, or the habitual user, but to most people with adequate typing ability who used the Spectrum only accasionally, it was cumbersome and awkward. It would take minutes to find a little-used keyword. So the passing of that and the awkward editor will not be regretted.

The numeric keypad, although not supplied with the basic unit, contains some powerful additions to the editing commands. You can move left and right a word at a time, or to the start or end of a line. Using those keys in conjunction with delete allows you to discard whole swathes of a line very quickly. You can also jump through the program 10 lines at a time. In 128 mode, much of the Spectrum Plus keyboard is redundant. Inverse and true video keys are no longer used. Colour control codes cannot be embedded in a listing and you cannot use the cursor keys while in graphics mode. None of those are really great losses.

Sound – the major innovation

The edit key has a new function. On pressing it, a menu appears. You can select 128 Basic, Renumber, Screen, Print or Exit. Exit will take you back to the power-up menu to use the calculator. Renumber works very quickly and deals with all line number references. Screen confines editing to the bottom two lines of the screen. That obviously is useful if manipulating the screen display and, due to the ability to scroll through a listing, it is an adequate way of dealing with small problems. Print will make a listing of the program to a printer attached to the RS232 port and 128 Basic returns you to your program. That also cancels the effect of selecting the screen option.

The effect of all the extra RAM is not so apparent in 128 mode. No instructions are given on how to use the extra memory directly but it can be used as a RAM disc. A stricter term for that structure would be RAM tape, as you can only load, save, catalogue or erase whole files. Possibly it might be useful for storing data. It is certainly very fast, saving even the biggest programs virtually instantaneously.

Possibly the major innovation of the machine is its sound. Not only has the pathetic internal speaker been given the axe in favour of putting the sound through the TV but the machine has a new sound chip, the ever-popular AY-3-8912. That chip is exploited by the addition of one keyword, Play; what follows is a list of up to three strings. All the hard work is done by the letters and numbers in the string.

All the various facilities of the chip can be used. You can have notes or noise on any combination of the three channels. There are eight octave ranges, each of which contains two octaves which overlap with the octave ranges either side. You can then specify the note in usual musical notation, as well as sharps and flats. Note lengths can also be specified – even triplets. The amplifier stage used produces a much better sound than the Amstrad, which uses the same chip.



It seems that Sinclair has no plans at present to drop its bread-and-butter Spectrum Plus. So the obvious question is why buy a 128 rather than a Plus? Much depends on the price, which was not clear at the time of going to press. Will a sound chip, some extra RAM and a few ports of fairly dubious value really persuade you to part with the extra cash? Will software houses design programs to appeal to the small market of 128 owners when there are all those Plus owners?

Sinclair has tried to answer those questions by preparing a catalogue containing 76 software titles and 20 peripherals for the machine.

For the punter, the lack of a truly tangible benefit in the way of a joystick or Microdrive port will count against it. The inclusion of such an interface could have created a new market for the machine some way above the existing machine for those who were certain they wanted to do more than play games. The component cost of doing so could not have been more than a few pounds and would also have done a good deal to boost the amount of Microdrive-based software. The price of £140 for the Plus, tape deck and joystick is a difficult act to follow. The new sound facility is very pleasant and if the Midi lead and suitable software follow rapidly, that could be one potential market, as the price of Midi keyboards continues to fall.

If Sinclair decides to phase-out the Plus in the near future, you have to look at how the new offering compares to the Commodore and Amstrad machines. The Commodore 128 has yet to make a significant impact on the market and it is not clear if it will. The 64, however, despite its smaller memory, offers significant opposition after the price of a joystick interface is added to the 128.

The Amstrad 6128 still seems like a winner in value terms if you have £300-£400 to spend but for most people still not certain how long the bug will last, the Spectrum will remain the best way of entering computing.

Commodore 128

Success can be a staggering problem, particularly for computer companies. Fame and fortune can come very quickly, with one particular model gaining unprecedented popularity in months, while other models from the same company perish in less than a year.

No-one knows that better than Commodore, which tried to follow the success of the 64 with the Commodore 16 and Plus-4. Both machines were unmitigated disasters although they have had something of a re-birth since major price-cutting just before Christmas, relieved only by the fact that the 64 continued to sell in huge numbers throughout 1985.

It was still clear to Commodore, however, that it has to move on from the 64, which by now is a four-year-old machine. The only sensible solution, and a fairly obvious one, was to build a machine both fully-compatible with the 64 and yet a good deal better. Thus the Commodre 128, with built-in Z-80 processor, CP/M operating system, Basic 7.0, 128K RAM and 64 compatability mode, was born in 1985.

From the beginning, Commodore made it clear that a C128 with built-in disc drive eventually would be available. Commodore had, however, so many times announced products which it eventually decided not to build – remember the Commodore LCD portable or the Hyperion-based IBM-compatible Commodore portable shown at CES and Hanover respectively? – that everyone took the stories of the on-board disc machine with several truckloads of salt.

Commodore, however, has delivered. In this exclusive *Your Computer* review, I can tell you that the machine, dubbed officially the Commodore 128D, is alive, well and living in the U.K. I was given an opportunity to use several prototype versions at the Which Computer? Show at Birmingham and then obtained further exclusive details from Commodore.

The first thing you will notice about the C128D is the price – only £499 plus VAT with built-in 5.25in. double-sided 1571 disc drive, detachable keyboard and a monochrome monitor.

This makes it a very attractive alternative to the Amstrad PCW 8256 word processor CP/M machine. Of course, you have to pay for a printer – a similar-quality printer to the Amstrad offering would cost about £150 – and word processing software – about £50 – but the competition does not offer software compatability with the 64 or produce the kind of sound and graphics it does. No doubt some will argue that you could buy an Amstrad PCW and a Commodore 64 for the approximate £700 price of the C128D system but that would be missing the point and ignoring the considerable merits of the C128D.

Looking the part

The C128D looks like a business system. It offers a detachable keyboard, on which there is a layout identical to that found on the basic Commodore 128, with a light and professional feel. I found the detachability of the 128D keyboard to be a pleasant change from the somewhat unwieldy size of the standard 128, which I always find difficult to move round without constantly worrying whether I am about to disconnect the printer, monitor or the power supply from the machine.

The Commodore 1901 monochrome green screen display is easy to read and pleasant to the eye. I appreciated particularly the location of the screen controls in a neat, fold-down panel at the front of the machine, instead of clustered in an arm-straining clique which constantly gossips round the back. My only criticism of the 1901 is that it might be a little bigger than it needs to be, although some might argue that that makes it easier to read.

Like the non-disc 128, the C128D offers not one but two versions of Basic – Basic 7.0, the best on-board machine programming language I have seen from the company – and Basic 2.0, as used on the Commodore 64, one of my less favourite Basic dialects, involving massive numbers of PEEKs and POKEs to accomplish relatively simple operations.

Features such as AUTO, RENUMBER, HELP and DELETE make it much easier to develop clean-looking programs which have a much better chance of running the first time you try to execute them. HELP is of great assistance when you get an error message. It will find the line containing the error and list it to the screen, hgihlighting the portion which is causing problems. Meanwhile, commands such as WINDOW and PAINT make the business of defining and colouring areas on-screen much more carefree.

The new Basic seems to take maximum advantage of the enhanced 128 hardware. A FAST command allows you to use the machine in 80-column mode at the full 2MHz clock speed offered by the 128 design and then switch back to 1MHz as and when you have to switch back to 40 columns.

For many years Commodore computer market. Recently fallen from their premier pos though that, in the shape of have found a worthy succes

Disc drive operations are also handled a good deal more sensibly with commands such as CATALOG, BSAVE, BLOAD and BOOT available to deal directly with disc files, rather than manipulating them as data channelled through a given device.

Disc drive operations become even better when you start digging into the bundled CP/M operating system. Although command structures are somewhat archaic by the standards of machines like the IBM PC and the Macintosh, there is not much you cannot do with CP/M when you know how.



The C128D looks a business system.

D

ELIGHT?

ESPAIR?

ARING?

ELICIOUS?

The choice of CP/M with standard 5.25in disc drives also means that CP/M software written in the MFM format is read/write-compatible with the C128D. Thus you should be able to read files written on the Kaypro, Osborne One and IBM PC.

Do not get carried away on the last point, however, and start thinking the 128D has any measure of PC compatibility. It does not; the only IBM PC files it can read are those written under IBM CP/M version 1 and 2 and IBM CP/M 86. Most popular IBM software runs under MS-DOS, although it should be possible to copy files from MS-DOS format to CP/M, if you really wanted to do so.

The real advantage of 5.25in. CP/M is the vast wealth of software which, with little or no modification, should be able to run on the 128. Commodore explains it like this:

"Because CP/M has been implemented on almost every computer ever designed that used the Intel 8080 or the Zilog

*ominated the home
ough the company have
on. Geof Wheelwright thinks
e C128D, the company may
r to the 64.*

Z-80 CPU, there is a very large amount of software available for running on CP/M systems. The most comprehensive catalogue of commercial software is the CP/M Software Finder published for Digital Research by Que Corporation."

Going native

The 128D documentation also gives details on how to instal CP/M software so that it will talk to Commodore printers and other output devices.

Storage is provided by the built-in 5.25in 1571 disc drive. It is the double-sided version of the 1570 drive which was released last year for the basic 128. It can be used in both CP/M, 128 native mode and 64 mode. The drive, like earlier Commodore storage devices, has a certain amount of on-board intelligence so that it works-out automatically whether it is reading a 64 program disc, a CP/M disc or a disc formatted under 128 Basic 7.0. The intelligence is provided by a 6502 processor, 2K RAM and 32K ROM inside the drive.

Data transfer rates for the 1571 are not too fast in 64 mode – 300cps – mainly because the drive is well and truly emulating the snail-like 1541 drive, although vastly improved speeds of up to 5,200cps are possible under 128 and CP/M control.

Software is probably the machine's strongest suit and the best argument for the 128D over the Amstrad PCW. Most of the huge library of games and business titles for the 64 should run on the 128D, although it will take somebody a long time to go through and test them all, while many CP/M business programs will be easily transported to the 128D with little or no modification.

The best software, however, will still probably be from those software houses which choose to write for the 128 native mode, as that can take advantage of the 2MHz speed and the high-speed data transfer rates the machine can offer. Commodore has promised that a range of native mode business software will be available from launch, including the Script 128 word processor and the Micro Clerk integrated accounting system for retailers.

Tough competition

The C128D seems solid and well-designed. Considering its experience in the home market, it is perhaps not surprising that the company can produce a hardy-looking machine but it is heartening to see that it has opted for a three-box design – monitor, CPU box and keyboard – which eliminates the where to put the monitor? conundrum which faces some users of the basic 128 and 64 machines. The integration of CPU and disc drive in one box also eliminates much of the spaghetti of wires and cabling which afflicts many low-cost home and business systems.

The documentation we saw was little different from that offered for the standard 128 with a 1571 disc drive. It is, as you would expect, in two manuals – one for the drive and one for the 128. I suspect there will also be a brief manual also directing you to the best use of the monitor.

The Commodore 128 System Guide is a standard spiral-bound job, with the kind of comprehensive tables, appendices, program examples and keyword explanations common to the 64 manual. I would, however, direct anyone who wants to make copious use of the 64 programming mode to also buy the Programmer's Reference Guide. No doubt there will eventually be a 128 version of it.

The Commodore 128D is entering a market in which it faces tough competition. Atari and Amstrad are both itching to corner the home/business market around the £500 mark. Even the ancient BBC has been updated to tackle this group but I think the 128D will be difficult for any of those machines to beat in terms of flexibility and the quality of its software base.

There may be better buys for people who have limited goals for their equipment, such as doing only word processing, but for general use I think Commodore have finally found a worthy successor to the 64.

Dream Machine

A price tag of £2300 means that the Macintosh computer is out of the financial reach of most Your Computer readers. For those of you who want a computer to dream about – Geof Wheelwright has the details.

Forget the AMX mouse, the QL ICE system and even the Digital Research GEM system as used on the Atari ST for a moment. I know they are all lovely and affordable WIMP – Windows, Icons, Mouse and Pointer – systems but is there not the nagging feeling that they are not the real thing?

The real thing is, of course, the now-classic Apple Macintosh business micro. The Mac, and the Lisa which preceded it, were the first machines to popularise and bring together ideas pioneered by Xerox on its Star range of machines and in doing so changed the face of business software forever.

As I write – the much-loved but little-bought by home computer enthusiasts – Mac was undergoing major changes which should gain even greater affection and, for the sake of Apple, bigger sales in the U.K.

The ultimate Macintosh is the new Macintosh Plus, a machine with one megabyte of RAM (1,024K), to which an additional three megabytes can be added, a numeric keypad, a huge 128K ROM, which vastly speeds the machine, and 800K storage on internal and external drives.

At slightly more than £2,300, it still promises to be the object of dreams and desire rather than purchase for many enthusiasts and home computer users. If you want a computer to dream about, it is altogether a better class of machine than many you are likely to see in the Land of Nod.

Speed

I was fortunate recently to have my Mac dream come true as Apple sent one of the first 15 machines to roll off its Cork production line in January.

The first thing you notice is the speed. None of the clock-watching which has become commonplace for users of the Atari 520ST, the QL or even the old Mac was apparent with the 'MegaMac'. It is a Ferrari-speed machine. The disc drive accessing times are two or three times faster than the original and a RAM-cache ensures that recently-used data is pulled quickly from RAM instead of disc.

The new machine, however, is quietly deceptive. Like an old Volkswagen Beetle with a Porche engine, the new Mac is the same size and dimension as the old – old machines can be upgraded to the new Mac Plus specification without occupying more desk space – but runs much faster. The only outside physical differences between old and new are the nameplate on the front and a reduction in size for the printer and modem sockets to make way for an industry-standard Small Computer System Interface – pronouced 'scuzzy' – expansion interface port. The other noticeable difference, of course, is the longer keyboard which includes cursor keys and a numeric keypad.

Daisy chain

The most important of the 'outside' differences is the SCSI port, which allows you to daisychain to seven high-speed devices from the one socket. I have already made up a shopping list which includes a letter-quality printer, hard disc, tape back-up system, digitser and laser scanner, to go with the Apple modem and the LaserWriter Plus laser printer which would be *de rigeur* for such a system.

Under the lid, the main attraction is the expanded RAM size. Imagine starting your system with 1MB of RAM, let alone being able to take it up to 4MB within the legally-addressable memory space. The RAM expansion is provided simply and elegantly by upgrading the type of RAM chip used, from the 256K chips currently supplied to provide the 1MB to the planned 1MB RAM chips which are just round the corner.

By now you may be wondering what good all this state-of-the-art hardware will be if there is no software to run it. That is the really good news. The new Mac should be 100 percent software-compatible with the old and most programs will be able to make use of the new RAM with a modification.

With more than 1,000 good pieces of business software available – and several hundred of the best games I have seen – my dream machine would suffer from no shortage of things to sing and dance about. The Switcher, the Apple task-switching applications integrator, also really comes into its own within the 1MB, allowing you to run a variety of applications in memory at once without being restricted by speed or RAM.

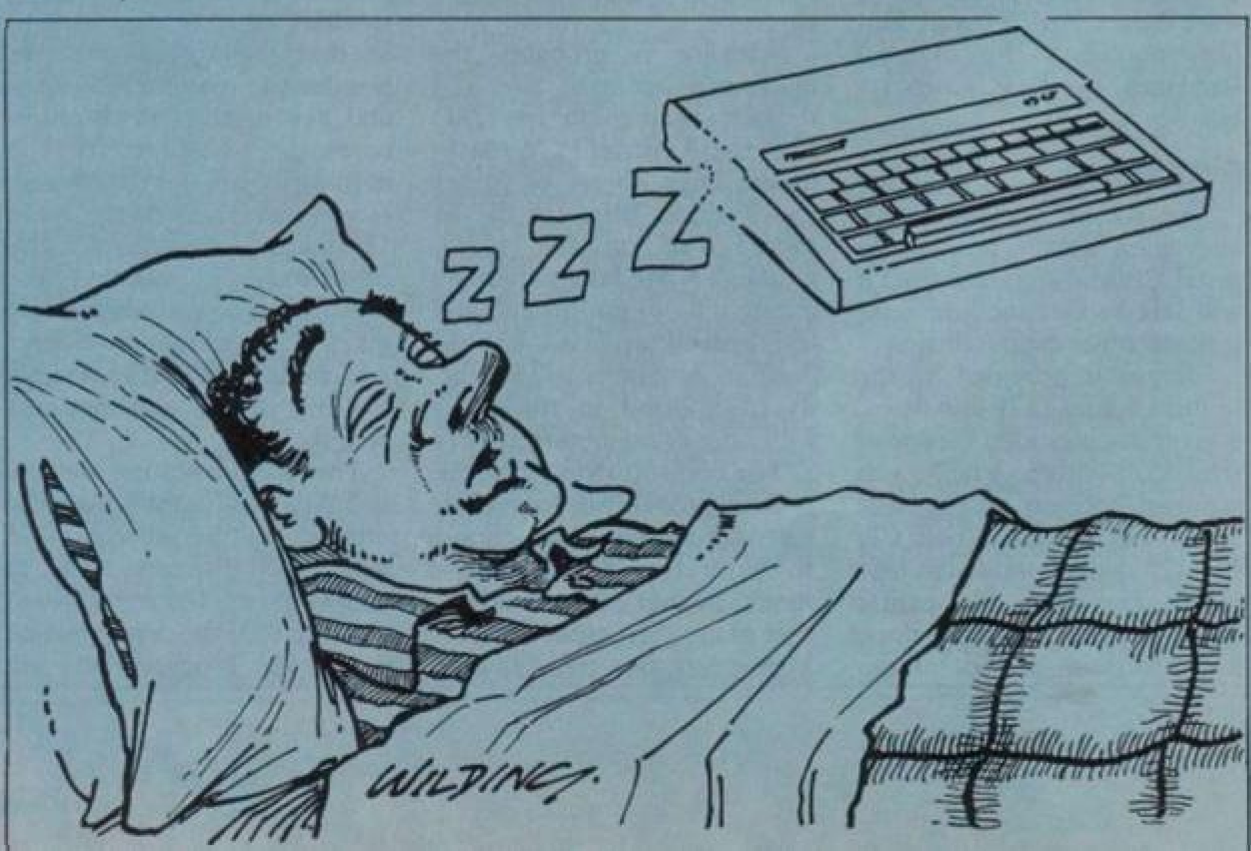
times impinges on even the best of dreams. The fast is that both Commodore and Atari offer machines which will be cheaper than the MegaMac, while offering specifications which appear much better on paper.

Probably the biggest direct competitor is the Atari ST series, to which Atari recently announced it would be adding its own 1MB version, called something like the 1040 ST, and which uses the very Mac-like GEM system. Despite striking similarities, so much so that Apple was able to lean on Atari and Digital Research to make cosmetic alterations to GEM so that it looked less like the Mac, the ST still lacks many features offered on even the old Mac.

Software base

The Apple unit is compact and runs entirely from one mains plug, while the Atari machine needs separate plugs and connections for the monitor, CPU and disc drive(s) respectively. The software base for GEM, while much bigger than any other Mac competitor, is still much smaller than that on the Mac.

The Commodore Amiga, on the other hand, is the machine



which alternates in my reveries when the Mac Plus is not taking pride of place. The Amiga is almost a complementary machine to the Mac, with its strength in graphics, sound, music, speed synthesis and multi-tasking.

The Amiga looks far less like the Mac and in its own way pushes technology just as much as the Apple offering. Again, however, software availability is the great leveller and with more than 600,000 Macs sold world-wide against only tens of thousands of Amigas so far, it is not difficult to tell which machine is the best-supported.

Meanwhile, I will stay with my dreams about the MegMac, a wonder machine which reminds me of that famous story about the seven-stone weakling who sets about a massive body-building program after having beach sand kicked in his face by a muscle-bound bully. The IBM PC kicked beach sand in the face of the original 128K Mac, at least in sales terms, and compelled it to undergo an extensive weight-training program. The new muscle-bound Mac has returned to the scene of the original crime, hoping that the tide has not yet gone out on its hopes of business success.

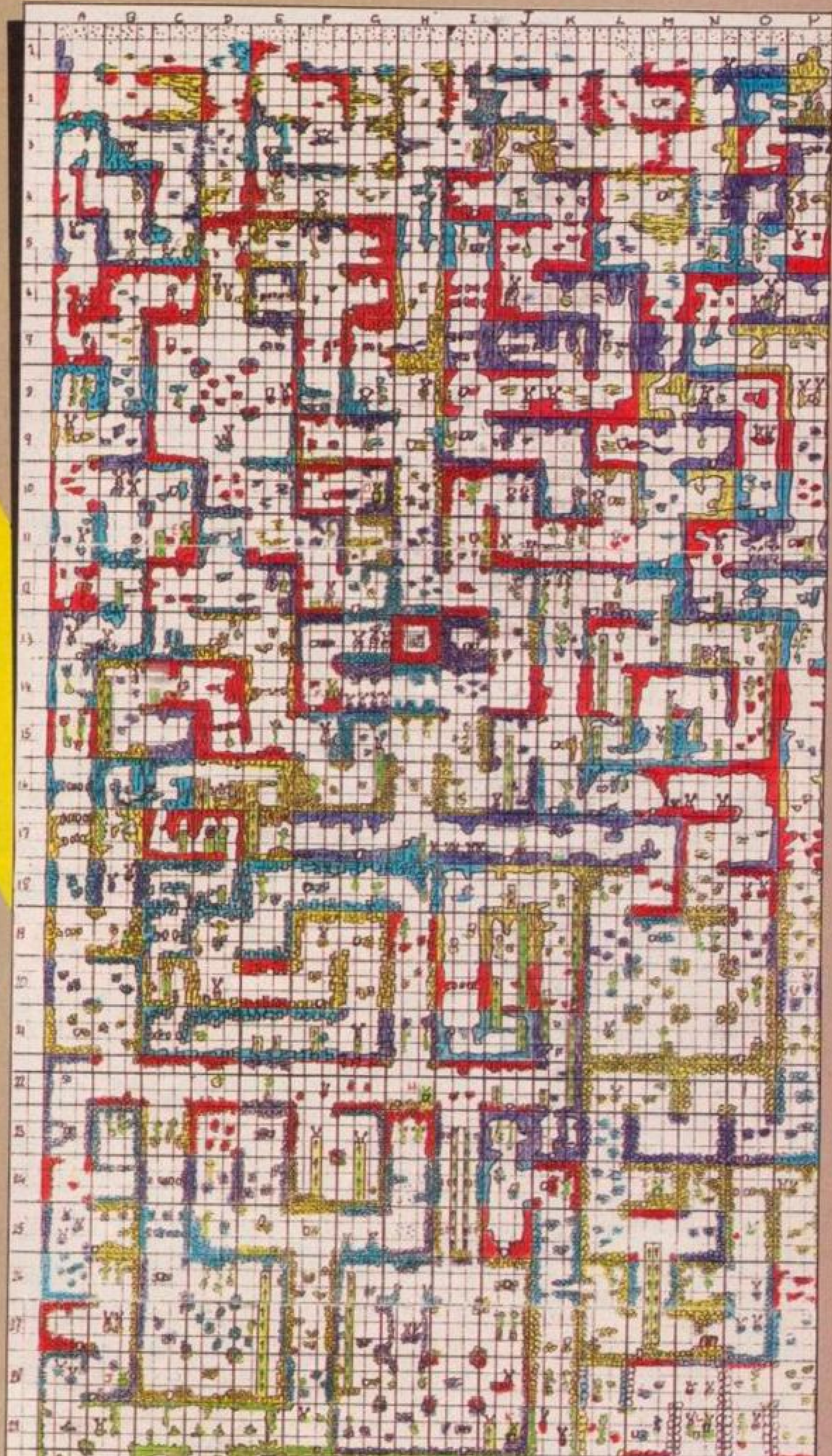




RE-WRITE WORLD HISTORY AS YOU ASSUME COMMAND OF THE ALLIED OR GERMAN FORCES IN THE ULTIMATE OFFENSIVE ON THE WESTERN FRONT!!
TIGERS IN THE SNOW
£9.95 CASSETTE
£14.95 DISC
COMMODORE 64/128
& ATARI (Disk only)
"KEERRR !!! * ... REQUEST ... ARTILLERY BACK UP IMMEDIATELY ... ENEMY TANKS ADVANCING ... ** REINFORCEMENTS REQUIRED ... KEEERRR!! ** ... MOVEMENT HERE RESTRICTED ... AIRPOWER NEEDED ... * ... WEATHER CONDITIONS ... ABYSMAL ... *** ... WE'RE GOING IN !!! ... ** ... OVER ! ..."
Transatlantic SIMULATIONS
Unit 10, Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 8881
SSI
STRATEGIC SIMULATIONS INC

STARQUAKE

MAP by
Dan Homoka



It's the dead of night – no one can hear you scream. No one, that is, except David Williams. Call him on 041-770 9599 after 9pm for help with your adventure problems.

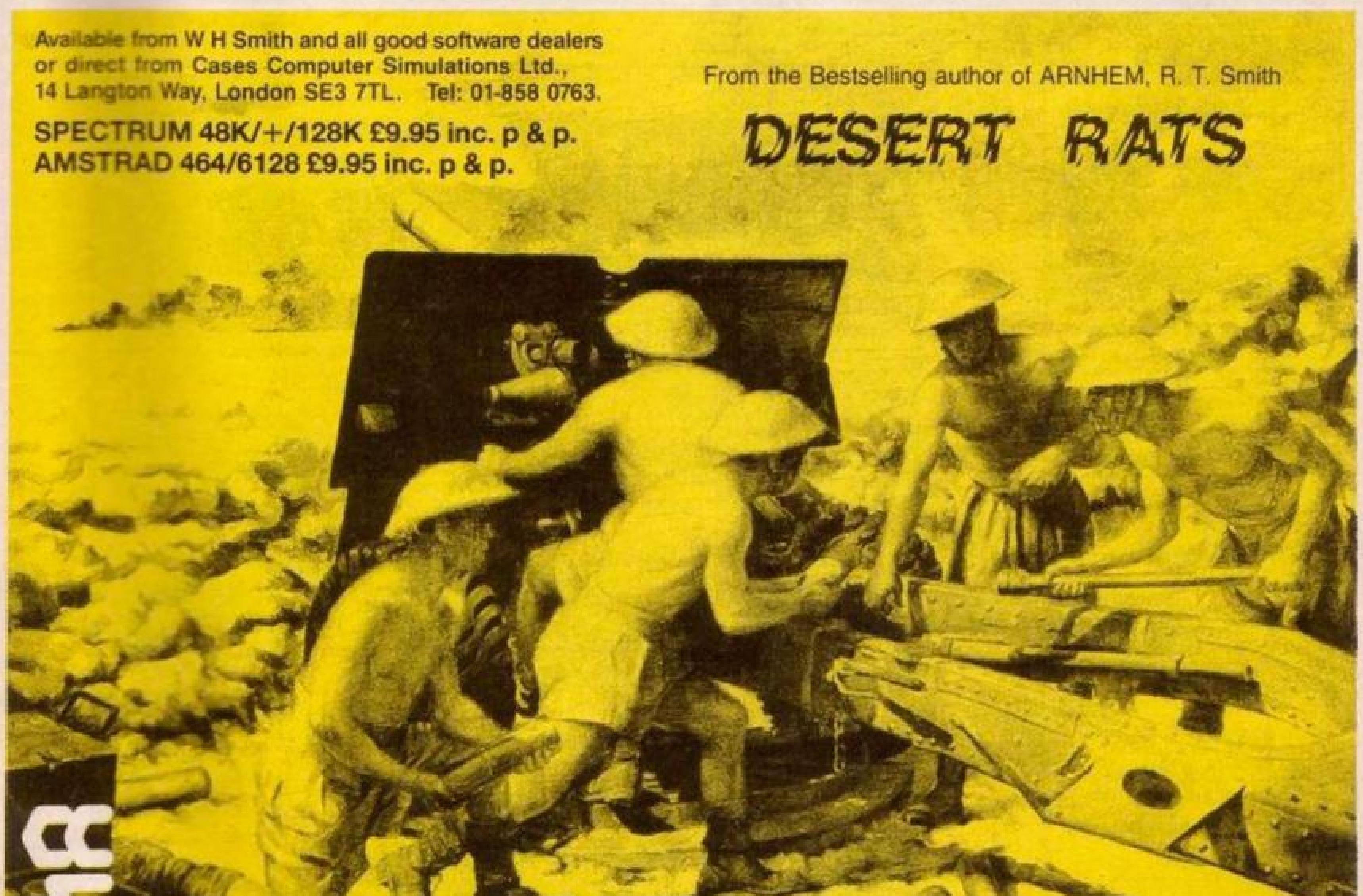
KEY

- starting screen
- transporter bases
- teleporter
- zappers
- security door
- lift
- smash traps
- locked door
- wall types

Teleporter codes:

A – RAMIX	(P2)
B – VEROX	(I3)
C – TULSA	(C5)
D – ASOIC	(G10)
E – DELTA	(C11)
F – QUAKE	(F14)
G – ALGOL	(B19)
H – EXIAL	(H22)
I – KYZIA	(M24)
J – ULTRA	(B28)
K – IRAGE	(J29)
L – OKTUP	(N29)
M – SONIQ	(G30)
N – AMIGA	(D32)
O – AMAHA	(K32)


GRAVIS MK VI
GRIP THE STICK
All the others are out of date.
High impact, rugged construction
Padded foam, metal reinforced grip with integrated fire button
Adjustable grip tension
Three independent fire buttons
Extremely sensitive micro switches on all buttons
Single-handed operation
£29.95 includes packing + postage
Cheques or postal order to:-
Teknacron Circuits Ltd
Landguard Manor Road, Shanklin, I.O.W. PO37 7LH
GUARANTEED TO LAST. ONE YEAR'S FULL WARRANTY
For use with:
Sinclair Spectrum
Sinclair QL
Commodore 64,
Apple and Amstrad
BBC
Acorn
IBM PC


Available from W H Smith and all good software dealers or direct from Cases Computer Simulations Ltd., 14 Langton Way, London SE3 7TL. Tel: 01-858 0763.
SPECTRUM 48K/+/128K £9.95 inc. p & p.
AMSTRAD 464/6128 £9.95 inc. p & p.
From the Bestselling author of ARNHEM, R. T. Smith
DESERT RATS

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 60p per word (Min 20 words) — prepayable

Linage advertisers should complete the form provided in BLOCK CAPITALS. Phone number counts as 2 words. Name and address to be paid for if used in advertisement. Box Number if required is £7.00 extra.

Display — rates per scc (Min 2scc)

One insertion	:	£10.00
Three insertions	:	£9.70
Six insertions	:	£9.50
Twelve insertions	:	£9.00

Display advertisers should provide seperate copy and preferably reserve space by phone (01-661 3036).

Method of Payment

Cheques etc. should be made payable to Focus Investments Ltd., and crossed. I enclose herewith cheque/PO for

£ ....

Please debit my Access/Visa Barclay Card/American Express/Diners Club Int/ /as below

SIGNATURE

Post to:

Cut out the order form and return together with your remittance to: Classified Department, Your Computer, 20-22 York Way, London N2.

Please insert the following advertisement in Your Computer Classified Section

					LINAGE	PLUS 15% VAT	TOTAL
					£12.00	£1.80	£13.80
					£15.00	£2.25	£17.25
					£18.00	£2.70	£20.70
					£21.00	£3.15	£24.15
					£24.00	£3.60	£27.60
					£27.00	£4.05	£31.05
					£30.00	£4.50	£34.50

No. of insertions required ☐ Box No. required YES/NO

NAME *(Please include initials)* ....

ADDRESS ....

....

....

Payment by credit card please state address card is registered

Daytime tel. no ....

Company Registered Number: 1895201. Registered Office: Sceptre House, 169-173 Regent Street, London W1R 8HE.

INDEX OF ADVERTISERS

Next month

Special Features

AMSTRAD SUPPLEMENT

In the first of a regular series of supplements we look at the rapidly increasing range of hardware and software available for the Amstrad range of computers.
In addition we take an in-depth look at the computers themselves including some interesting tips on using the PCW 8256.

AMS MAGAZINE/ MAKER

AMS, in association with Watford Electronics, have launched a further enhancement to their range of mouse based products.

COMPETITION

Win a Commodore 128D in an easy to enter competition. Commodore's new version of the C128 is exclusively previewed in this issue of Your Computer. *Our conclusion is that after a few tries, Commodore finally have a worthy successor to their 64 machine.*
PLUS
Skyfox competition. Ariolasoft have just launched the Spectrum version of their hit game Skyfox. Next month Your Computer *features a competition with aviation as the theme.*

Plus

Part Two of our Programming Course

In which we show you how to develop the skills that will make you the master of your computer's operation rather than slave to its idyosyncracities.

Buyer's guides

April's Your Computer *will feature two buyer's guides. These will feature comprehensive round ups on computer monitors and to musical add-ons for the popular home computers.*

Contents subject to late revision

NEWS ● REVIEWS ● HINTS & TIPS ● CLUBS ● SOFTWARE GUIDES

Diary

DATE	EVENT	VENUE
7-9 March	Atari Computer Show	Novotel, London (DB)
22-23 March	Amstrad Computer Show	New Century Hall, Manchester (DB)
31 May, 1 June	Official Commodore Show	Novotel, London (DB)
12-14 June	Apple '86	Novotel, London (DB)
24-27 July	Acorn User Show	TBA (DB)

KEY: DB – Organised by Database Publications (061) 480 0171

CRUSADE IN EUROPE

Are you a great strategist? Now you can find out by stepping into the thrill and excitement of some of history's greatest events!

"Crusade in Europe" from Micro-Prose takes you there

CODE DAY CARD	
DAY	CODE RESPONSE
3	GOODWOOD



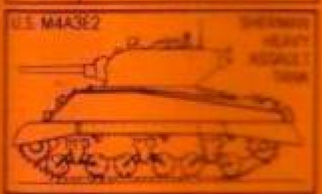
– from D-Day, to the "Battle of the Bulge", and provides challenge and excitement in a historically accurate and easy to play strategic simulation. And, best of all, you'll be in the thick of the action in minutes, even if you have never played a strategic simulation before!

To play "Crusade in Europe"



requires both careful strategic thinking and fast responses to rapidly changing battlefield conditions. These simulations occur in accelerated real time, with action taking place continuously – just like real battles! No slow plodding action here! These outstanding simulations feature colourful animated graphics, great sound

CODE DAY CARD	
DAY	CODE RESPONSE
4	BOLERO





effects, and a new, quick and easy-to-use command system to enter commands using a joystick or the keyboard. "Crusade in Europe" allows solo play from either side's perspective or exciting direct competition between two opposing Generals. The computer handles all the rules, provides play balancing, and even the ability to change sides in the middle of the game! Other features include multiple scenarios from a single screen mission to an in-depth campaign using a ten-screen scrolling map, strategic maps, game save, and a unique "flashback" function.

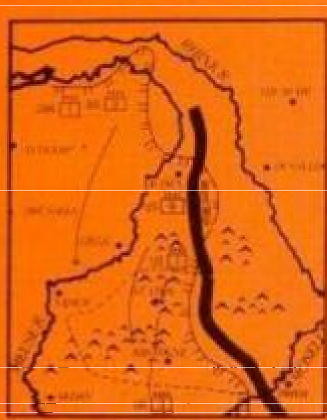
D-DAY & THE NORMANDY CAMPAIGN

In 1944, the war in Europe hung in the balance. In the East, the Germans were struggling to hold back the Soviet juggernaut. In the South, the Western Allies had conquered North Africa and Sicily, and their armies were slowly advancing up the Italian peninsula.

In the crucial Western theatre a blow had yet to be struck. Until the Allied armies crossed the English Channel and defeated the Germans in France, the outcome of the war could not be guaranteed.

On the morning of June 6th 1944, German sentries manning the "Atlantic Wall" gaped in awe as the greatest armada ever assembled appeared through the morning mists. D-Day had begun.

This is the moment – the turning point of World War II. History in the making and you're in command – on the beaches of Normandy. Choose your strategy carefully, for although your armour is superior the terrain is difficult; you'll be measuring your progress to Paris in yards!



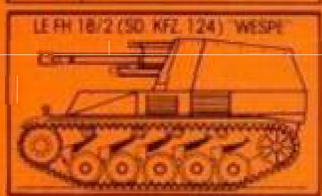
"A BRIDGE TOO FAR" – THE BATTLE OF ARNHEM

"Operation Market Garden" – Montgomery's audacious airborne offensive. Will it be successful or would a more direct route cost less in casualties and time?

"THE BATTLE OF THE BULGE"

An 'all or nothing' last desperate counter attack by Hitlers last legions. Will the

CODE DAY CARD	
DAY	CODE RESPONSE
9	DAVID



Allies withstand the offensive – or will they be humiliated as the crack Panzer divisions push them into the Channel?

You'll enjoy hours of thrilling entertainment, in this, the first of a new generation of strategy simulations because THIS TIME YOU ARE IN COMMAND!

Transatlantic SIMULATIONS

MICRO PROSE
SIMULATION • SOFTWARE

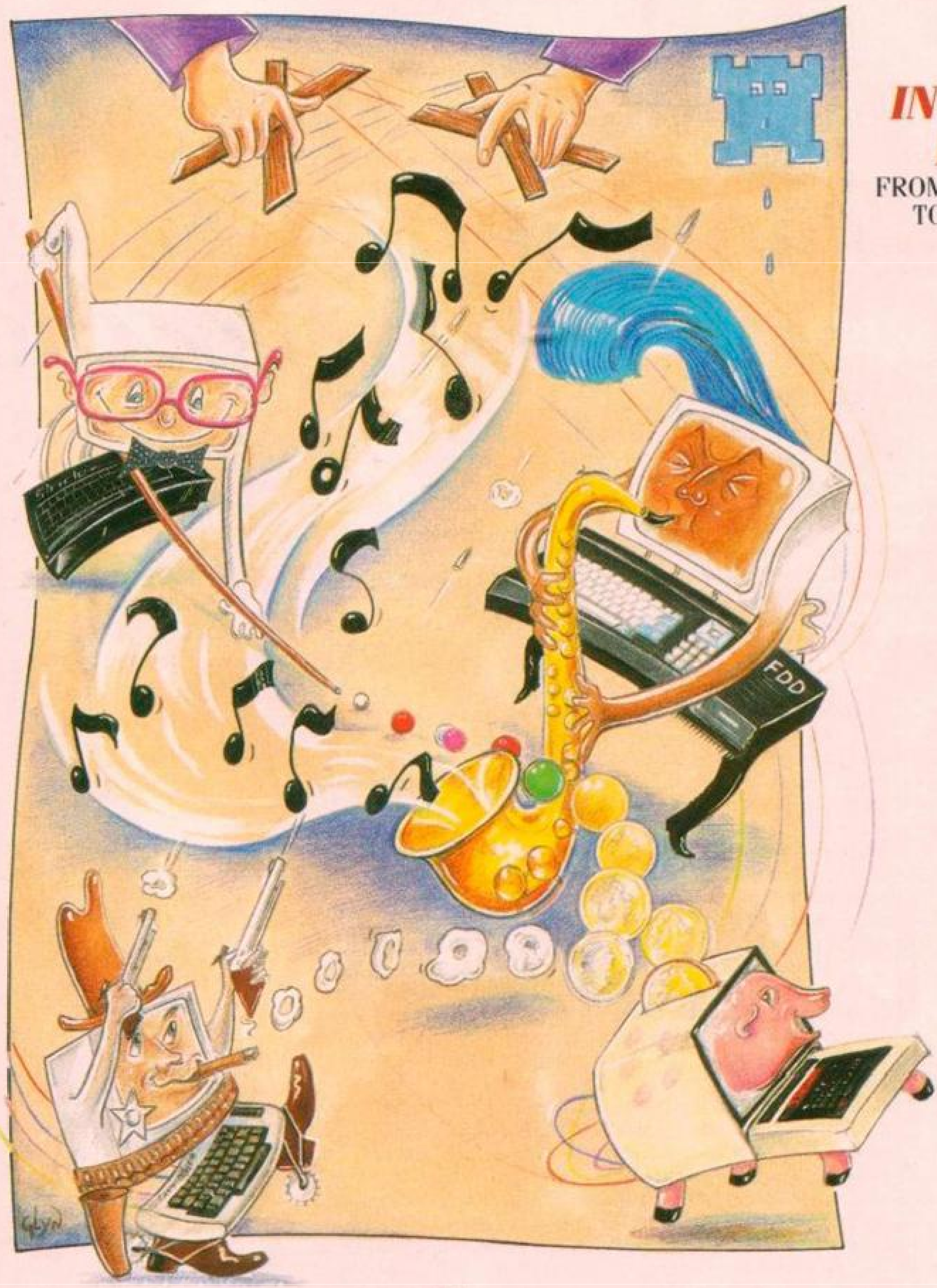
ATARI 64

Transatlantic Simulations Limited
Unit 10, Parkway Industrial Centre
Heneage Street, Birmingham B7 4LY

Your COMPUTER COURSE

MARCH 1986

A COMPREHENSIVE GUIDE TO PROGRAMMING



INTRODUCING LANGUAGES
FROM FORTH PROTOCOLS TO BASIC STATEMENTS

A-Z OF COMPUTER JARGON
PARLEZ-VOUS COMPUTER SPEAK?

MACHINE CODE CRACKED
THE MYSTERIES REVEALED

MUSIC & GRAPHICS
CREATING SOUND AND VISION!

Welcome to the *Your Computer* course, a six-part series which will put you in the front-line of programming and using your micro. We will show you how to program in Basic, which language to choose if you become disenchanted with Basic, how to program in machine code, how best to make use of sound, graphics and music on your micro, and finally how to deal with the vast library of jargon which festoons the microcomputer business.

The series will be offered in collectable monthly parts, so that you can build your course, following each section as its printed. We will also offer a directory for the course in the issue following the publication of the last part, so that you can find your way easily round the finished course.

We hope you enjoy the course and find that it adds considerably to your fund of knowledge about programming. We have tried to keep it simple and easy to understand, without making it so basic that it repeats what you have in the programming manual you receive with your machine.

It is assumed that you will have had at least a passing familiarity with Basic, as laid down in your machine documentation, and that you have some interest in programming. Beyond that, we ask only that you read and enjoy.

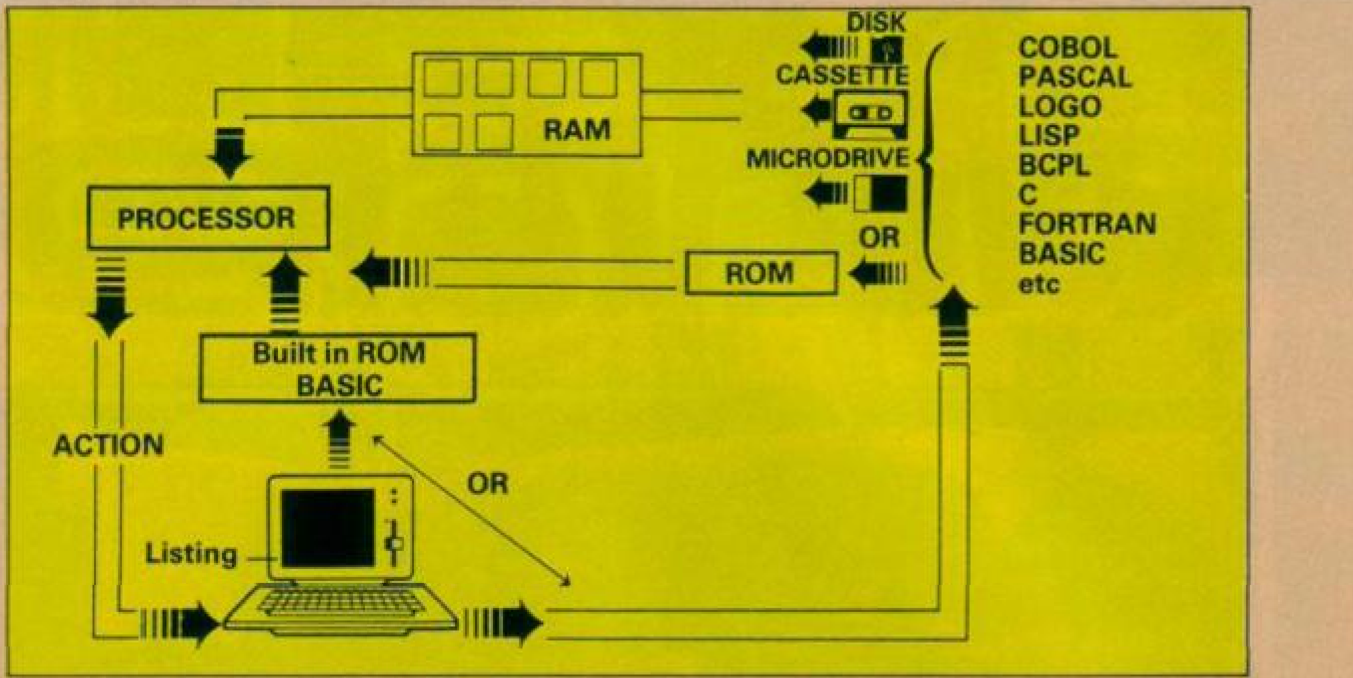
So sit down, relax and get ready for a series of entertaining lectures. The first class begins opposite.

INDEX

Contributors:

Geoff Wheelwright

and David Janda.



Tools of the programmer's trade

Basic was designed to be an all purpose programming language for students to learn computing. It is still by far the most popular program language used on micros, but by no means the best.

Computer languages are really tools to help you do the job of operating your computer – and Basic is just one of a wide range of popular programming tools available to you. In the next six issues, we will be looking at the screwdrivers, hammers and jigsaws of the programming world – a world in which Basic could be compared to a pocketknife; useful for many small jobs, but not something you could stand working with all the time.

The major criteria in examining alternatives to Basic has to be the types of programs you plan to write. Some programs are fast at sorting databases, while others excel at maths calculations. Certain languages provide you with more precise control over any instruments you may have hooked to your machine and yet others are designed to be easily-modified.

Prolog, for example, is used for data-base management purposes because it has very flexible data types. Comal, on the other hand is ideal for those who wish to learn a more structured language than Basic, yet retain some of the finer points of the latter. If process control or very fast processing is required, then Forth is the ideal language. If scientific and mathematical problems are to be tackled, Pascal is the obvious choice.

Even if you are not involved in a specific area of computing, it is still worth learning a new programming language if only for the fun of it. To give you a taste of the diverse character of computer languages, we begin our series with some brief profiles of four interesting languages and dialects.

Prolog – Spectrum, C64, BBC model B.

Prolog – PROgramming in LOGic – is becomming one of the most popular programming languages. Used extensively in the field of artificial intelligence, it is one of the fifth-generation computer languages.

Conventional languages are not very flexible when it is a matter of describing the problem to be solved. It would be far better if it were possible to describe the problem in general terms by describing the problem in an English-type manner. Providing the description contains all the data necessary to solve the problem, it should, in theory, be possible for a computer to find the answer.

Computer languages are tools to help you with the operation of your computer. Without them the machine will not function.

A declarative type of language such as Prolog can, to an extent, achieve this. A Prolog program consists of a set of rules and facts which make up a program description. Both facts and rules are referred to as sentences which must be written in a precise form, known, not surprisingly, as a sentence form. Any questions put to the program are called queries.

Prolog, the core language, is a little difficult to understand and learn, so a user-friendly front-end called Simple has been developed to make Prolog easier for beginners to use.

Here is a mini-database of facts and rules relating to a group of people:

likes (Diane Colin)

```
likes(Janet Ian)
smokes(Ian)
smokes(Jean)
enjoys(Diane rock)
enjoys(Jean reggae)
gives(Sam Diane gin-and-
  tonic)
gives(Sam Colin cola)
```

The structure for Prolog facts is as follows. First, there is a predicate such as 'likes' which is followed by a bracketed list of terms called arguments. Predicates correspond roughly to verbs in English and arguments to nouns. Here is a more complex sentence:

```
partners(Diane Sam) if
  gives(Sam Diane gin-and-
  tonic) &
  not smokes(Sam)
```

With the information stored in the micro, an IS query can be used to ask simple questions:

```
is(likes)Janet Ian))
```

YES will be displayed. IS simply finds out whether a relationship is true or false. Another example is:

```
is(smokes(Janet))
```

NO will be displayed.

A more complex question can be asked:

```
is(partners(Diane Sam))
```

This time Prolog has to do a little more work. Prolog had to find whether Sam gave Diane a gin and tonic AND didn't smoke! YES and NO are not very informative answers.

A WHICH query uses variables in place of data objects:

```
which(x : smokes(x))
```

```
Ian
Jean
No (more) answers
```

.. would be displayed. Prolog is asking which term could replace x in the goal 'smokes(x)' to make the goal succeed.

Comal – C64, BBC model B

In the early days of computing, Basic was not accepted by all as the answer to everything. People realised that it had many faults and that it could be improved. The structure and syntax of Basic was often criticised and because of that Comal was invented.

Comal and Basic are very similar in many respects and that helps the Basic user to progress to Comal very easily. There are, however, significant differences between the two, and once Comal is mastered it is easier to progress to more modular languages such as Pascal.

Comal allows a programmer to write code in a modular fashion. The dreaded GOTO is not allowed; instead, labels can be used to jump to a specified section of the program. Procedures are fully-supported with the use of EXEC. Using EXEC with parameters allows a call to a PROCedure which can have local variables assigned to it.

A case statement is incorporated which is similar to ON GOSUB, although more flexible. The FUNC command allows multiple line functions to be defined, unlike the Basic equivalent where single-line functions are permitted.

LIST will produce automatically an indented listing which is easy to read. Comal also 'fills' in pieces which the beginner may omit, consider the following:

```
10  FOR A=1 TO 1000
20  B=A
30  NEXT A
```

will list in Comal as:

```
0010  FOR A:=1 TO 1000 DO
0020  B:=A
0030  ENDFOR A
```

Forth – all major home computers

Of all the programming languages available, Forth must be one of the most popular. It has been chosen by many manufacturers as the second language for their machines. Part of the reason is the vast amount of Forth public domain software and so anybody can implement it on a machine, without the worry of being sued.

Forth was invented by Charles H Moore in the late 1960s and early 1970s and was designed primarily as a control language for telescopes. Two main versions of Forth are in use, Fig-Forth which was developed by the Forth Interest Group (FIG) and Forth-79. An updated version of Forth-79 called Forth-81 is also available.

Many describe Forth as the high-level-low-level language. That is because Forth has high-level control constructs yet operates very close to machine level, to the extent that you have to manipulate a stack when using the language. The fact that Forth commands (words) do not relate directly to what happens is a little confusing when looking at a Forth listing. As an example, the Forth word '.' will print a number which is on the top of the stack but you would not gather that from looking at the word.

Forth, however, is very powerful. So far as speed is concerned, Forth is almost as fast as machine code and that is another reason for its popularity. The biggest asset of Forth is that the programmer is not tied to any set commands.

Forth words are held in what is called the dictionary, which can be added to. This is done by defining a new word:

```
: GREETING ." Hello" ;
```

Here, a new word called GREETING has been added to the dictionary and whenever you need to print 'Hello' you simply enter GREETING.

That can be used within other Forth words, so if you wanted to define a word to print 'Hello' one hundred times, the following would do it:

```
: WELCOME 100 0 DO
  GREETING LOOP ;
```

It should be noted that the new definitions are normally written using an editor, saved to tape or disc, and loaded with the Forth at the start of each session.

Languages are the hammers, screwdrivers and jigsaws of the programming world.
As ever, it is important to choose the right tool (language) for the task in hand.
Basic, for example, is ideal for many tasks but unsuited to games programs.

Pascal – All home computers

Pascal, like Forth, was designed by one man and not a committee. Nicklaus Wirth, the inventor of Pascal, designed the language to be used as an aid to teach programming. Pascal has been taken up in business and scientific areas and it is the language taught in many colleges and universities.

The benefits are that it is supposed to promote good programming practice. Programmers are almost compelled to write code which is organised into logical segments. That is the theory and, in practice, people who learn the language write programs which are easier to understand and debug.

Unlike Basic, Pascal permits users to define their own data types. That means that, as well as integers, characters and real numbers, more can be defined. A data type consisting of the pieces on a chess board is one somewhat obscure example.

The structure of a Pascal program is rather strange to Basic programmers. Pascal requires groups of commands to be embedded in blocks within the Pascal statements BEGIN and END. Procedures and functions are fully-supported and can reference each other freely.

Pascal requires all identifiers (variables) to be declared at the beginning of the program, as well as arrays, constants, data types and records. To Basic programmers that is horrible, because it means they have to know what identifiers are used before the program is written.

It is difficult at first to become accustomed to the language but once the disciplines have been accepted, better programs can be written.

```
PROGRAM Demo (INPUT,
  OUTPUT);
VAR
  I : INTEGER;
BEGIN
  FOR I:=1 TO 100 DO
    WRITELN(I,I*I);
END.
```

Most home computers will have versions of the foregoing languages available for them. Make a thorough search when buying a language package, as there will probably be more than one version of the language available for your micro. Be prepared to buy some tutorial books as well, as the manuals are not always well-written.

Computer jargon has become the bane of many us[e]
boffins, ensuring that the level of understandin[g]
concerned about the linguistic integrity of the la
to bring together terms, both frivilous and funda
cover letters A to D and acquaint you with Lettic



A

■ **Algorithm:** A mathematical and/or logical procedure used to solve problems. See **Bug.**

■ **Alphanumeric:** 'Has alphanumeric keyboard' is a flash way of saying it has all the letters of the alphabet and numbers 0-9 on it. Beware of non-alphanumeric keyboards.

■ **Analogue to digital conversion:** Computers think in numbers (digits) while broadly the world continues with analogue scales, so you cannot say things like "He smelled fively." To have a computer do so – and they do – you need to convert the analogue scale to digital.

■ **Analyst:** The role of analyst is of critical importance in the computer industry and is defined by many businesses as someone who examines a manual system which doesn't work, replaces it with a computer system which doesn't work but costs you £X,000, then charges you £100 an hour for his time. Theoretically, an analyst defines problems, then develops systems for solving them.

■ **APL:** A Programming Language. Like all programming languages of which you heard but never used, APL is powerful and easy to learn. Like all those languages you will probably never have to use it.

■ **Applications software:** Computers are supposed to make it easier for you to perform specific tasks, or applications, so the programs a computer runs to do those tasks fall under the heading of applications software. The best applications software does not work at all. Beware of that which works it will become apparent that it does not only after you have lost several thousand pounds.

■ **Architecture:** Nothing to do with office blocks. The way a microprocessor is designed, the architecture governs organisation, location and amount of temporary storage, processing capacity and so on.

■ **Arithmetic:** The process by which some micros multiply 2 by 2, divide the sum by 2 and get 1.99999. If you understand why they do it you probably wish you did not.

■ **Array:** A computer stores information in an array. Imagine you are postboy for a large company. Your array is a big bank of pigeonholes, into which you put the mail, or information. A table showing the multiplied values of number 1x1 to 12x12 is also an array.

■ **Artificial intelligence:** It is arguable whether or not computers think but they certainly do not reason, so while they can calculate till the cows come home, they are incapable of that wild, off-the-wall stroke of genius you once had/might have/wish you could have. The industry, however, is working on this one and true artificial intelligence will mean that computers will be able to hold ordinary jobs and/or even become President of the United States.

■ **ASCII:** The American Standard Code for Information Interchange, naturally enough, emanates from the ASCII Corp in Japan. ASCII assigns a number to each of the characters a normal keyboard can produce so that, for example, when a computer says to a printer 'print 32' the printer knows that 32 is a space. Otherwise the computer would have to spend time describing what a space is.

■ **Assembler:** A way to convert a Basic program which works slowly into a fast machine code program which does not work. See **Machine code.**



B

■ **Background task:** While you are typing at a word processor you may want your computer to be doing something else. A program which does that while you are working in the foreground is performing a background task. See **Multi-tasking.**

■ **Back space:** It has nothing to do with your back garden. Backspace is the key which might delete the character immediately to the left of where you are on the screen, or it might move you on top of that character. See **Standardisation.**

■ **Back-up:** Originally to take a security copy of a program or file. Now used interchangeably with pirate and steal.

■ **Bar code:** One of those stripey things you see on a tin of beans. It is there because computers have difficulty reading difficult things like "Now only 23 pence a tin." Supermarket checkouts cannot usually read bar codes, either, but occasionally you see one which can on *Tomorrow's World*. It will happen one day.

■ **Basic:** Beginners' All-purpose Symbolic Instruction Code, the programming language run by the vast majority of microcomputers. Some say it is like English but either they are wrong or they say things like: FOR N=1 to 255 : PRINT N;",";CHR$ (N) : NEXT It is much more like English than other programming languages but you should not be carried away.

■ **Baud:** Does not mean bits per second but for all the difference it makes it might as well do so. Baud is a way to measure the speed at which information can be sent, hence bits per second. See **Bit.**

■ **Benchmark:** As used by the Ordnance Survey, a benchmark is a standard height mark against which other heights can be judged. The term is used by computer manufacturers to provide sometimes misleading information, based on tests.

■ **Binary:** Fred Flintstone, cave-dwelling father of modern arithmetic, had 10 fingers, hence decimal. Computers have only two fingers, on and off, and so count zero, one, ten, eleven, one hundred.

■ **Bit:** Short for a binary digit. A bit is the smallest element with which a computer can deal and can have one of two values – 0 or 1. See **Binary.**

■ **Black box:** Any piece of hardware which does something you don't understand – but does it properly – is a black box.

■ **Boolean:** A form of logic used in programming. Not widely understood.

■ **Boot:** Often used to mean 'switch on' but of computers should more properly mean 'switch on and wake up'.

■ **Bootstrap:** A program which tells the computer what to do when it wakes up, i.e., print 'Hello, where am I? How do I feel this morning . . . uh . . . READY>'

■ **Bottom-up programming:** A method of programming which concentrates on the detail and crosses its fingers that the bits will all work when they are fitted together. Much derided.

■ **Bubblesort:** A method of sorting where pairs in a series are swapped until the whole series is in order.

■ **Buffer:** Member of a Whitehall gentleman's club. Alternatively, a way to store data for a short time where the originating machine works faster than the receiving machine.

■ **Bug:** When your computer tells you 2+2=Tuesday you have a bug in your program. See **Feature.**

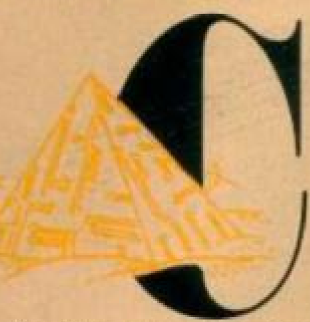
■ **Bundle:** A method of selling unsaleable software by including it with a computer which otherwise would be poor value.

■ **Bus:** A configuration of circuitry ostensibly meant to pass information between one part of a system and another. An expansion bus is a plug which if you could get the proper cable – which you can't – would allow you to connect your computer to

sers. Often new terms creep quietly into the daily language of ng among most people remains low. At Your Computer we are language and have thus assigned language expert John Lettice damental, to make up the following glossary. In this issue, we ice's idiosyncratic view of the computer world.

add-ons, if they were available, which they're not.

■ **Byte:** Eight bits. See **Bit.**



■ **C:** Possibly the computer industry's favourite programming language. See **Techie.**

■ **Cable:** When you've just bought a computer you'll find a cable is the one piece of equipment you need which isn't included. Alternatively, a cable is the piece of equipment included instead of the proper cable.

■ **CAD:** Computer Aided Design. Industry pros wax lyrical on the potential of this area. If involved in a conversation, use the terms 'Kray', 'Max Headroom', 'gigabyte of memory'.

■ **Card:** A piece of paper listing the permanently-engaged telephone number of the guy who sold you the computer which doesn't work. Alternatively, a card is a crucial piece of your computer which was not included when you bought it, allowing the manufacturer to sell you something else. See **Expansion slot.**

■ **Cartridge:** A small slot-in piece of hardware which allows you to turn your micro into a games console – worth half the price of your micro.

■ **Cassette:** The cheapest way of storing programs. So you have only yourself to blame when it doesn't work.

■ **Character:** Jack Tramiel. Alternatively, a letter, number or indescribable blob which appears on your micro screen.

■ **Character recognition:** Saying "Jack Tramiel is a force to be reckoned with." Alternatively, a way to make a computer read a paper document and understand it as q pwqer documitt. Optical scanning is not all it might be . . .

■ **Character set:** Jack Tramiel's family. Also all the letters and numbers your micro can handle. A character set is always missing one character (e.g., £) which you need desperately.

■ **Chip:** This is what it's all about. The current generation of computers runs on chips made of sand. Lawrence of Arabia was sitting on a gold mine.

■ **CMOS:** Complementary Metal Oxide Semiconductor, a flash chip which draws much less power than standard chips and therefore is used in battery-powered machines.

■ **Cobol:** Computer language used in business programming.

■ **Command:** Used to instruct computers. Usually elicits the response 'Syntax error'.

■ **Communications:** First drunk: "Is this Wembley?" Second drunk: "No, it's Thursday." First drunk: "So am I, let's have another drink." Imagine two computers having that conversation and you understand communications.

■ **Computer:** A device used to automate manual functions so that they take more time and *cost more to perform.* Whatever its size, a computer will occupy more space on your desk then you have available.

■ **Conditional branch/jump:** The point at which you lose track of what the program you have written is doing.

■ **Control characters:** Unidentified garbage on the screen.

■ **Conversion:** A method used by games software producers to make a Commodore 64 look like a Spectrum or, alternatively, to make a 64 program a mess when running on the Spectrum.

■ **Co-processor:** When a manufacturer has made a great deal of money by selling you a machine with an under-powered CPU, it can make even more money by selling you a more powerful CPU, or co-processor. See **CPU.**

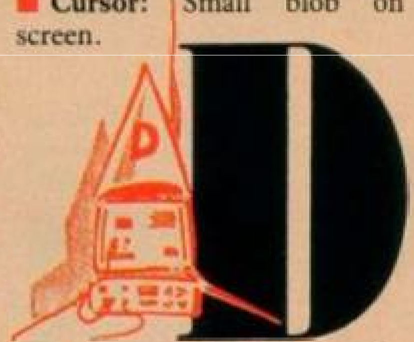
■ **CP/M:** Sometimes claimed to stand for Control Program/ Microcomputer but also sometimes claimed to stand for something else. Until recently CP/M was something which was the industry-standard operating system for micros and that was all you needed to know. Since Amstrad machines generated a CP/M revival it has also become necessary for you to know what CP/M is. See **Operating system.** See **Industry standard.**

■ **CPS:** Characters per second. A poorly-calibrated scale used by printer manufacturers to produce a figure 25-30 percent greater than the maximum speed their printers can achieve.

■ **CPU:** Communist Party of Yugoslavia to those in the know but in the micro world it stands for central processing unit. The CPU is the main chip inside the computer.

■ **CRT:** Cathode ray tube, the central component of a television set or monitor. Television sets have more components and are therefore cheaper. Monitors have fewer, so are more expensive.

■ **Cursor:** Small blob on screen.



■ **Daisychain:** Description of a group of peripherals linked in a series. To make it work you must take it apart, check all the connections and put it back together again. It still won't work.

■ **Daisywheel:** A printer head which has letters arranged round it like daisy petals. Slow, noisy and generally missing one essential character. See **Character set.**

■ **Data:** Forget chips. This is really what it is all about. Data is the information manipulated by a computer program, then stored in a form which proves to be irretrievable.

■ **Debug:** Ten percent of computer programming involves writing, the rest debugging. See **Bug.**

■ **Default:** Most computer errors are default of the operator. Default values are pre-programmed parameters – governing printer line spacing, for example – set to operate if you refuse to answer the computer's questions.

■ **Delete:** See **Back space.**

■ **Demodulator:** The part of a television set which makes it cheaper than a monitor. See **CRT.**

■ **Device:** See **Black box.**

■ **Diagnostic:** Program used by a computer to identify faults. If your micro is not working, don't consult your dealer, run the diagnostics disc. That will confirm that it isn't working and advise you to contact your dealer.

■ **Directory:** A list of files on a disc, generally missing the one you want.

■ **Disc:** Piece of plastic which allows you to store almost as many files as you need to store. See **Winchester, Hard disc.**

■ **Disc drive:** Vent on front of computer, used for trapping dust, cigarette ash and so on.

■ **DOS:** Disc Operating System. Used by computer to control the flow of dust and cigarette ash to the disc drive.

■ **Dot matrix:** Dot matrix printers used to be of poorer quality than daisywheels but miniaturisation and Japanese join-the-dots technology has changed all that. Today's dot matrix printers produce outputs almost indistinguishable from those of a standard typewriter.

■ **Double density:** A kind of disc which will store twice as much information as a standard disc.

■ **Double precision:** System which uses more memory than you can afford to allow a computer to multiply 2 by 2, divide by 2 and get 2. See **Arithmetic.**

■ **Dumb terminal.** Expensive monitor with keyboard attached, communicating with a real computer which is somewhere else. See **CRT.**

Talk the languag of your micro

Home computers have one major disadvantage when you compare them to mainframe computers – they are slower. No doubt you have played video games on your micro and realised that you could not write a Basic program which could match the speed or even achieve the same effects as the game. It is not your lack of programming knowledge which is at fault but the language you are using – Basic.

Machine code is the native language of the microprocessor in your micro. Whenever you turn on your micro the processor is busy setting-up the computer for your use; checking the memory, performing various tests, clearing the screen, looking to see what other devices – printers, disc drives and the like – are attached to the machine. That normally takes about one-tenth of a second.

Even when you are not running a program the central processing unit is executing thousands of machine code instructions per second. When you use Basic, which is written in machine code, you are using a translator of a kind.

The program you have written is scanned by the Basic interpreter and translated into many individual machine code programs.

To find what machine code looks like, look inside the instruction manual for your micro and find the number of the memory location which is at the start of the Basic ROM in your machine. Enter this small Basic program, run it, and when prompted enter the number:

```
10  INPUT A
20  FOR C=A TO A+256
30  PRINT PEEK(C)
40  NEXT C
```

If you have the number of the first memory location (start address) of the Basic ROM in your micro, the screen will display numbers ranging from 0 to 255 – that is machine code.

So far as the CPU is concerned, machine code and data is represented in binary, or base 2:

Decimal	Binary	Hex
1	00000001	01
2	00000010	02
3	00000011	03
4	00000100	03
5	00000101	05
6	00000110	06
7	00000111	07
8	00001000	08
9	00001001	09
10	00001010	0A
11	00001011	0B
12	00001100	0C
13	00001101	0D
14	00001110	0E
15	00001111	0F

When POKing or PEEKing to and from memory from Basic, usually you use decimal.



When you use an assembler – a program to facilitate writing machine code programs – hex normally is used. An understanding of the binary numbering system is essential, as all mathematics in machine code are based on this system.

Programming in Basic involves tasks such as assigning values with the LET statement, performing calculations on variables, and issuing commands such as PRINT. Many of those things are the same for machine code programs, except that they are done in a different way, depending on the processor in your computer.

Machine code is the native language of the microprocessor in your computer. It can only understand m/code.

For example, the Z-80 is a general-purpose CPU used by many micros, including the Amstrad range and the ZX Spectrum/+. The CPU has 14 registers which can be compared to the Basic equivalent of variables.

Unlike Basic, however, where variables can be used freely by the programmer, CPU registers have special functions assigned to them.

Z-80 CPU registers

Accumulator	A F Flag
General purpose registers	B C D E H L
Interrupt	I R Refresh
Index registers	IX IY
Stack pointer	SP
Program counter	PC

There are six general-purpose registers for use by the programmer. One of the most important registers is the accumulator 'A', which is used for most calculations. Each register (or variable) can store a value between 0 and 255. Basic variables can be assigned in different ways and so can CPU registers. One way is to assign the accumulator a numeric value. If you want to load the accumulator with the number seven, the instruction and data will look like this in binary:

```
00111110
00000111
```

That is rather confusing. In Hex it would be:

```
3E
07
```

That is a little clearer but if we use an assembler, the instruction would be:

```
LD A,7
```

In other words, if you wish to learn machine code programming, get an assembler.

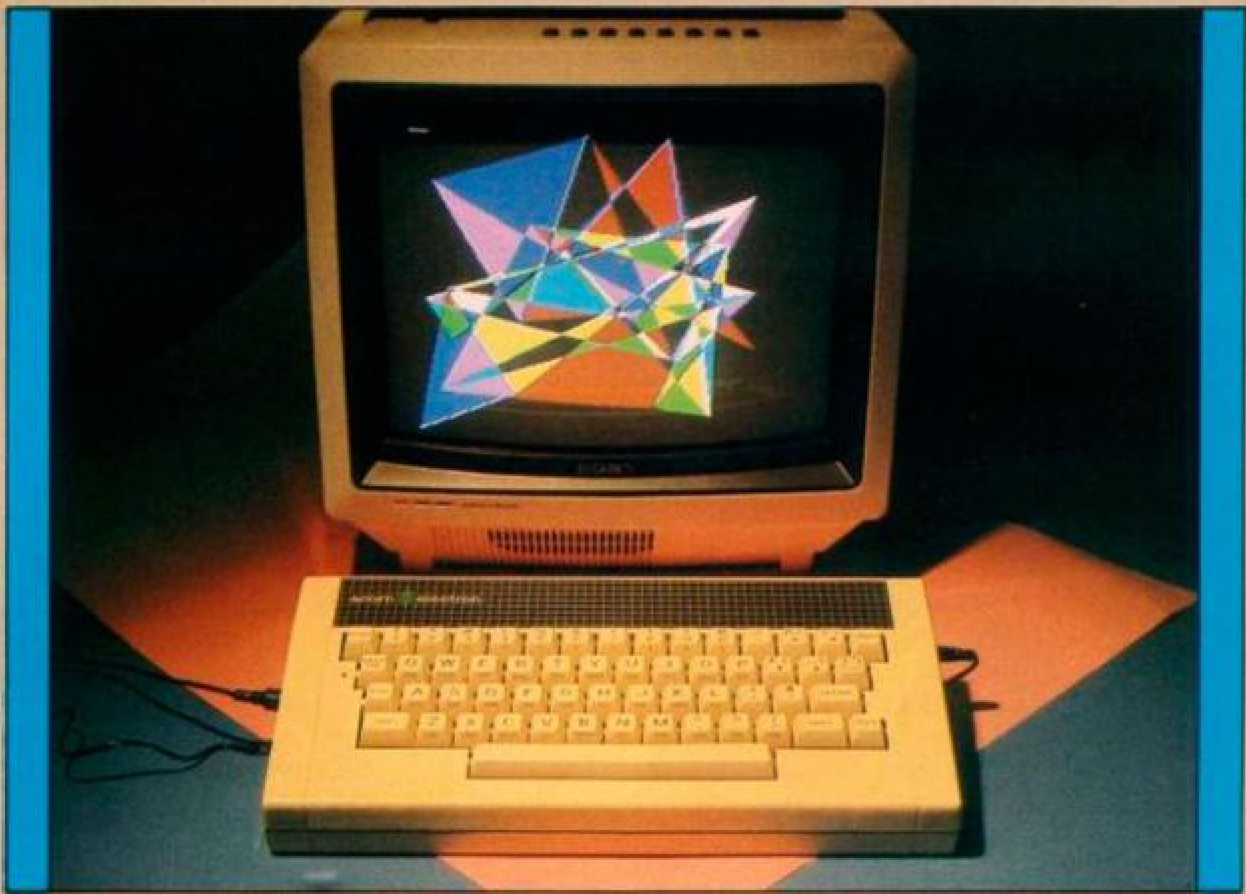
It is worth pointing-out at this stage that machine code instructions can occupy more than one consecutive byte in memory. The LD register direct instruction takes two locations; the first byte is used to identify the register and the second byte is for identifying the instruction.

Computers are stupid – when yo
programming you will apprecite
processors, such as the Z-80 and
rudimentary mathematics such
techniques are required to exten

The second method of loading a register is to load it with the contents of another register, e.g., LET A=B in Basic. The third method of assigning a register is to assign it a value from a memory location. That is similar to the Basic LET A= PEEK(625).

ge

n you start to learn machine code
ciate just how silly they are. Eight-bit
0 and 6502, can only perform
uch as add and subtract. Special
xtend their repertoire of operations.



The difficulty with single-byte registers is that they can have values only between 0 and 255. That is sufficient for most purposes but if a bigger number needs to be stored, individual registers can be treated as pairs. In other words, registers B and C are register pair BC. The range then covers 0 to 65535.

It is important to note that you cannot use registered pairs and single registers in the same program, e.g.:

```
LD B,6
LD C,10
LD BC,3456
```

and hope that BC is different from B and C – they are the same registers but paired.

The 16-bit general registers cannot be loaded with the contents of another register or with the contents of as memory location directly. It is possible, however, to use the registered pair HL as a pointer in memory:

```
LD HL,16377
LD C,(HL)
```

In that example, the register pair HL is loaded with 16377 and the contents of memory location 16377 are then loaded into register C. The LD C,(HL) is equivalent to LET C=PEEK (HL) in Basic.

There are a few ways in which program control can be changed in a machine code program. The Z-80 has two types of GOTO which are called JP. The first is very much like a GOTO but instead of jumping to a line number a memory address is specified:

```
JP 3432
```

That transfers control to memory location 3432. It can also be used in conjunction with the HL register pair:

```
LD HL,5452
JP (HL)
```

The JR, or Jump Relative instruction, will move the program pointer (PC) backward 128 or forward 127 bytes. The instruction is two bytes long, so to jump back 10 bytes the following code could be used:

```
16000 LD A,7
      .
      .
16008 JR –10
```

Another method of changing the program flow is to make use of the program counter. The PC always holds the address of the next instruction to be executed. Other Z-80 instructions can alter the contents of the PC and thus alter the program flow. Two such instructions are CALL and RET which are equivalent to the Basic GOSUB and RETURN.

Computers are stupid and when you start to learn machine code you will appreciate how silly they are. An 8-bit processor such as the Z-80 or 6502 CPU can perform only rudimentary mathematics such as add and subtract.

The accumulator is very important, as it is the only 8-bit register which can be used to store the result of a mathematics operation. The contents of the common registers, though, can be incremented or decremented by one:

Even when you are not running a program, your computer is far from idle. It is executing thousands of machine code instructions per second.

```
INC L
```

That adds one to the contents of register L. DEC operates in a similar manner, insofar as it subtracts one from a register. Adding and subtracting from the accumulator is also fairly straightforward:

```
ADD A,54
```

That adds 54 to the contents of the accumulator. To subtract a number from the accumulator, SUB n is used, as it is pointless specifying the accumulator in the instruction as it is the only register from which there can be subtraction.

There are a few more instructions in the Z-80 instruction set and most of them have different modes of operation. As can be gathered from this brief introduction to assembly language, all machine code instructions perform very simple tasks. To perform an operation such as finding the cube of a number would take several lines of assembly code.

If it takes several lines to do such a small task, you could be forgiven for thinking that writing a game may take a long time. That is not the case. All micros have an operating system and Basic which are made up of dozens of self-containing machine code routines which perform functions such as printing to the screen, detecting key-presses and so on. Using those routines it is possible to write very powerful programs which do not occupy too much room.

The best way to learn machine code is by practice. I would not recommend POKing decimal numbers in your machine. Instead, buy a good assembler and dissassembler – a program which converts the binary numbers into assembly language.

Another worthwhile purchase – as well as a good book on the subject – is a machine code monitor. That type of program allows you to examine and alter the contents of memory at leisure.

Musical pictures

Probably the most exciting programming task you can undertake with your micro is getting it to generate impressive music and pictures. With the comparatively large memory capacities of many of home micros, animated cartoon-style sequences with accompanying soundtracks are possible.

In the next six issues of this programming course, we will take you through the fundamentals of music and graphics programming and, near the end of the course, show you how to bring music and graphics together in one program. The example programs will be modular, so that combining music and graphics in the later stages of the course will be made easier.

There are a number of popular methods of developing graphics for use in micro software. The most difficult but by far the most common is to map out you computer screen pixel by pixel, determining what colour each would be. They are determined most commonly when programming in Basic by the use of data statements, which fill in the numbers which correspond to the information about colour and location of pixels.

The other less common but much easier method of incorporating graphics into your program would be considered as cheating by many programming purists but it is worth considering. It involves using a dedicated graphics development package which allows you to employ a joystick, mouse or cursor keys to draw pictures on-screen.

Once you have drawn those pictures using such software, you save them to tape, disc or Microdrive as picture files which can then be called-up and incorporated into your Basic programs. Pictures developed in such a manner are best used in a static fashion, such as providing graphic representations of events in a text adventure game.

We will be looking at both methods of incorporating graphics into your software, starting with the former more conventional method. Before you can begin developing colour graphics on your micro, you should get a good idea of what resources are available to you – i.e., the colours. Figure one is a short program for the Sinclair Spectrum which shows the basic eight BORDER colours on the machine.

Figure two is a similar program for the Commodore 64 which generates a series of colours randomly when you hit the space bar/key, giving you a quick idea of the colours available.

Sound, speech and music features on home micros vary enormously. The music facilities on the Spectrum Plus have been criticised as 'weedy', although many excellent add-ons are available to bring it to full strength, while the Commodore and BBC micro music generation systems have long been highly-praised.

In the next six months, we will look at ways of bringing out the most of each of those features on your machine, both through judicious programming and by buying certain articles of hardware which will enhance your system. We will give you specifications on Midi music interfaces which allow you to fit piano-type keyboards to your micro, synthesiser programs designed to let you simulate a wide variety of musical instruments, and a series of program listings which will give you a DIY method of developing your own music system.

To start, we offer a small sample listing – figure three – for the Commodore 64 which lets you play the notes C, D, E, F, G, A, B and 'high' C – using the keys Q, W, E, R, T, Y, U and I respectively.



In the next issue, we will look at music on the Amstrad, music interfaces for the Commodore 64, the BBC sound chip and speech systems on the Spectrum.

```
5 REM COLOURS EXAMPLE FOR THE SINCLAIR SPECTRUM
10 CLS
20 FOR X=0 TO 7
30 BORDER X
40 FOR Q=1 TO 200:NEXT Q
50 NEXT X
60 GOTO 10
```

Figure 1.

```
5 REM COMMODORE 64 COLOURS EXAMPLE
10 GET B$:IF B$="" THEN GOTO 10
20 PRINT CHR$(147)
30 X=INT(RND(0)*15)
40 IF X=0 THEN GOTO 30
50 POKE 53281,X
60 POKE 53280,X
70 FOR Q=1 TO 100:NEXT Q
80 GOTO 10
```

Figure 2.

```
10 PRINT CHR$(147)
20 GOSUB 450
30 SK=1
40 PRINT CHR$(147)
50 PRINT "PRESS THE 'A' KEY TO PLAY A TUNE"
60 C=-1
70 GET A$:IF A$="" THEN GOSUB 1000
80 GOSUB 600
90 GOTO 40
100 REM READ THE KEYBOARD
110 GET K$:IF K$="" THEN 110
120 F1=(K$="Q")*N(0)+(K$="2")*N(1)+(K$="W")*N(2)+
    (K$="3")*N(3)+(K$="E")*N(4)
130 F1=(K$="R")*N(5)+(K$="5")*N(6)+(K$="T")*N(7)+
    (K$="6")*N(8)+(K$="Y")*N(9)+F1
140 F1=(K$="7")*N(10)+(K$="U")*N(11)+(K$="I")*N(12)+F1
150 IF F1=0 THEN 110
160 F1=-F1
170 GOSUB 600
180 POKE I,F1-INT(F1/256)*256
190 POKE H,INT(F1/256)
200 RETURN
450 REM CLEAR SOUND CHIP
460 V=54296:AD=54277:SR=54278:W=54276
470 GOSUB 600
480 H=54273:I=54272
490 DIM N(12),S(30)
500 FOR T=0 TO 12:READ A:N(T)=A:NEXT
510 DATA 2195, 2325, 2463, 2630, 2795, 2930, 3104, 3288,
    3484, 3691, 3910, 4142, 4389
520 RETURN
600 FOR B=0 TO 9:POKE B+54272,0:NEXT B
610 POKE V,15:POKE AD,10:POKE SR,0:POKE W,17
620 RETURN
1000 GOSUB 110
1010 GOTO 1000
```

Figure 3.

NEXT MONTH

Delving deeper into machine code music on the Amstrad .

E for EPROM to H for Hardware and everything between in our Glossary.

At home with Pascal.